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S O W P

RADIO AVIATION EDITION

SPARKS JOURNAL

★ ★ ★ SOCIETY OF WIRELESS PIONEERS,INC ★ ★ ★

VOLUME 5, NO. 4 [JUNE 1983] - QUARTERLY - AVIATION RADIO [1]

EPIC FLIGHT OF THE NC 4

FLIGHT OF NC-4 HERALDS NEW WAY TO TRAVEL—DOOMS GREAT LINERS

The plans and logistics of the program were 'gigantic' by any measure. The U.S. Navy was to form a 'safety-net' of well over fifty ships, deployed along the flight route as a safeguard in emergencies and to assist, as necessary, with weather and navigational problems.

Most of the ships assigned were destroyers - the " 4-stackers or "Tin Cans" that had seen service in World War One. Four of these were stationed between Rockaway Beach the starting point and Halifax; 4 between Halifax and Trepassey Bay, Newfoundland; Twenty-two across the Western Ocean to the Azores; Fourteen from the Azores to Lisbon and nine more from Lisbon to Plymouth, England. Not all were destroyers. It was a GIGANTIC undertaking to say the least !

(Continued on Page 20)

U.S. Navy Conquers the Atlantic

Little did the world realize in early 1919 the impact Lt. Commander Albert Read and his crew of five on the new Curtiss NC-4 would have in future years on travel across the Atlantic Ocean and indeed the world.

The NC-4, an airship weighing 28,000 pounds, was the largest craft that had ever attempted such a flight and in retrospect was the vanguard of a mode of transportation that in a few decades was to literally seal the doom of the great liners - some, the largest ever built. The NC-4 and sister ships, the NC-1 and NC-3 were truly the avant guarde of the huge leviathans now crowding the skyways across the Atlantic in endless numbers.

The years between World War One and World War Two might be called ... "The Golden Age of Aviation". Interest in flying ran high all over the world. This was the setting for perhaps the greatest undertaking in aviation ever attempted in history except during war years.. —The Bridging of the Atlantic by Air.

Plans for the flight were initiated, according to U.S. Navy records, by John Towers, Chief of Naval Operation's Aviation Section who was convinced that the new type aircraft built by Glenn H. Curtis would establish a new record for the U.S. Additionally, Commander Richard E. Byrd wanted such airships for use in European waters as well as flights then on the drawing boards across both the North and South Poles. Josephus Daniels, Secretary of the Navy, was quite enthusiastic about the plans and gave the necessary approval to proceed.

Four flying boats were ordered by the Navy from Glenn Curtiss - one of the early pioneers. They were called the Model F-51 and recorded with NC numbers by the Navy. These included NC-1 , NC-2, NC-3 and NC-4. The NC-2 was withdrawn. What was somewhat unusual and significant about this group of planes was that they were included into "Seaplane Division No. One" Never before or since has such a small group of planes ever been made a Division in the Service.

Worldwide Front Page News

The New York Times.

NC-4 WINS FIRST OCEAN FLIGHT FOR AMERICA; 9¾ HOURS FROM PONTA DELGADA TO LISBON; HAWKER'S PLANE PICKED UP BY AMERICAN SHIP

HAWKER IN LONDON, TELLS REST OF STORY

Grave Storm With Pilot Transmitted Caution on Trip From Scotland and in Metropolis.

NC-4 LEAVES AZORES 6:18 A.M. GMT TIME

Arrives at Portuguese Port at 4:02 P.M., Averaging Over 82 Miles an Hour

GERMANY DEMANDS LEAGUE EQUALITY

RIVERS DAMAGE YALE BUILDINGS

FOREIGN REDS OUST BOLSHEVIKI

STRIKE IN CANADA SWEEPING WEST

The New York Times, 28 May 1919

Many Society Members Helped Pioneer Aviation

SPARKS JOURNAL QUARTERLY

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Founded 1968 by William A. Breniman

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Next Edition

Dear Editor

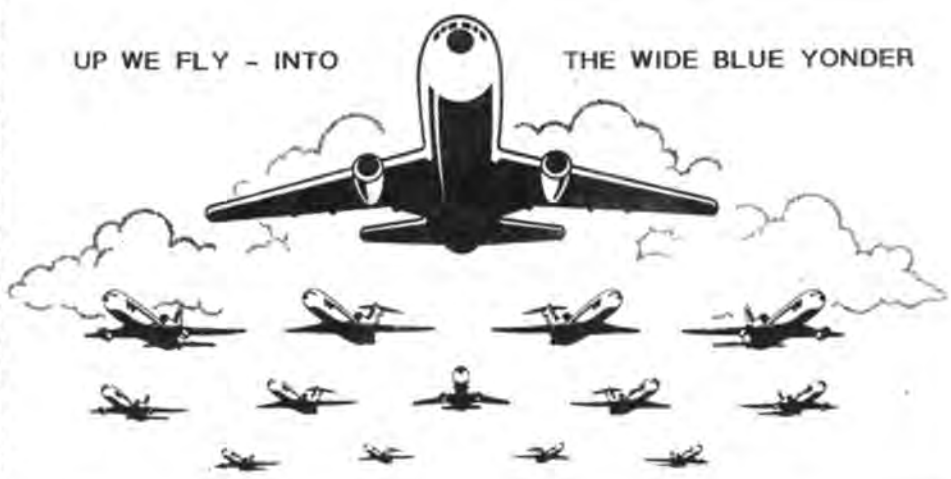
ANSWERING YOUR QUESTIONS .....
" WHAT WILL BE FEATURED IN THE NEXT EDITION ?"

We have received such a great imput of material for the Aviation Edition that it nearly swamped us. The 40-pages available in Sparks Journal does not begin to cover the many wonderful stories and material received. Therefore, another issue -- No. 2, will be used to include material which was received too late or other technical reasons. This will be issue No.2 as indicated.

Regretfully, we have not received stories or material on any of the foreign airlines including Trans-Canada,BOAC,KLM,SAS and others, also US carriers including UAL, CTL and many absorbed into the larger carriers. We do have material for the next issue from AAL, NWA and several other carriers plus, of course, the early days of the Federal Airways (CAA-FAA), Army and the Air Mail, USAF, Navy, USCG and others. This can be supplemented if you have historical information we could use including photographs, etc.

Why this great interest in Aviation Radio ? Probably because so many in our profession transferred from the Marine Field to position in the Air and Aviation Field where radio is indispensable. The fledgling industry could not have soared skyward without the capable assist of professional radio men and the communication media radio provides. We hope you like this issue. Suggestions are welcome.

William A. "Bill" Breniman - Editor.



Early Days of The Wireless - A Historical Record

AVIATION PIONEERS

Founders Page

The radio station pictured below had the distinction of being the 'Northern-most station' in North America. It was located about 300 yards from the Arctic Ocean and on a beach area west of Point Barrow, Alaska.

Though this was a permanet station, the building was placed on skids so that a tractor could move it in case the ice bergs were pushed up by the winds and current of the Arctic and threatened to crush it - always a very potential hazard.

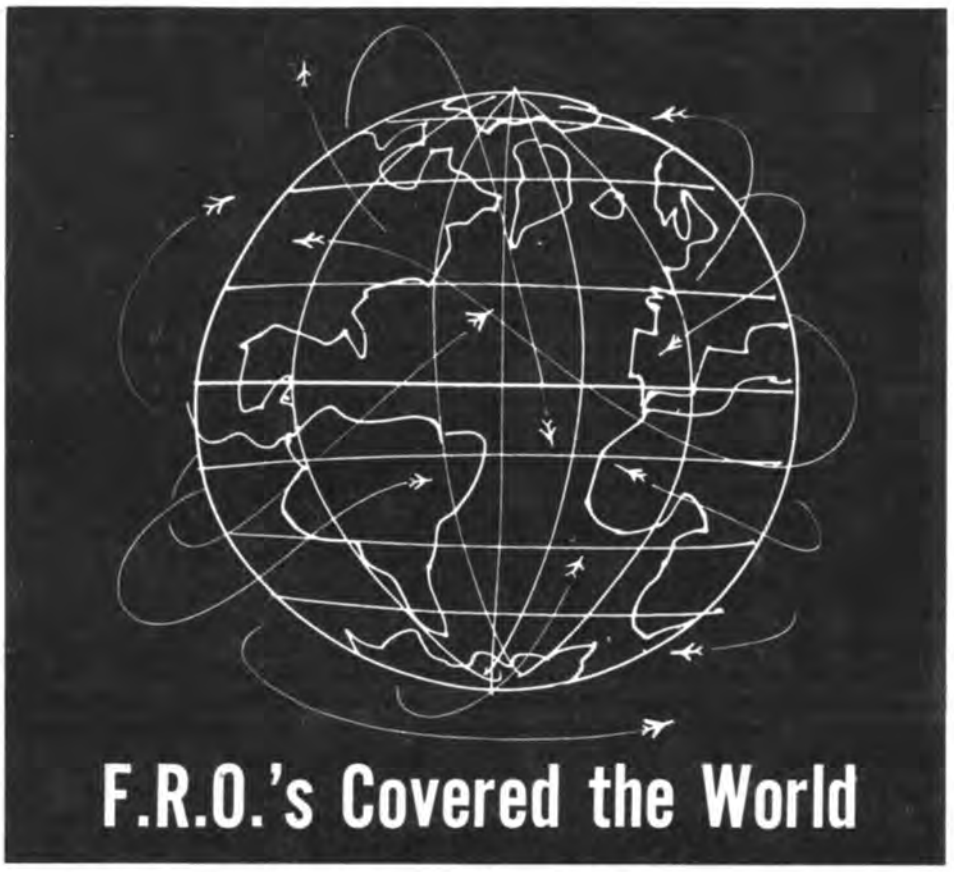
The station housed a MRL 4-loop radio range which could be used by pilots to set their course during inclement weather. The picture was taken by Frank T. Unruh (2900-SGP) now a Silent Key. Frank was Chief of the Communications Branch of CAA in Alaska. This is a picture of your editor, Bill Breniman taken Aug. 3 1951 standing in front of a "Weasel" used for transportation in the area. "Ye Ed" at the time was Deputy Chief of Communications Division, Civil Aerpmaitocs Administration, Washington D.C. and on an official speciation tour of all Alaskan Stations. Society member G.A."Jerry" Whittaker -[6-SGP] (W6FC) was Chief of the Airways Operations Division in all of Alaska for CAA at the time.

Flight to Point Barrow was made from Fairbanks on a U.S. Navy "Line-Haul" DC-3. Most of the seats had been removed for cargo and those remaining were installed facing the rear. We were lucky in picking a clear day for the trip north over the Yukon and the Brooks range of mountains - one of the most unique mountains I have ever flown over. It looked like the whole range was composed of mamouth sized rocks piled on top of each other.

We stayed at Barrow for 3 days waiting for a plane out. During this time, Frank and I were quartered in a large quonset-house. Meals were served at a 'mess hall' where quality was excellent and portions served almost unbelievable - like platters with steaks of about 2 plus pounds each per person. We were entertained one evening at the movies in which "First Release" pictures were run. They had not yet been shown stateside. Before the end of this trip, I was to see most of Alaska from the Air in company with Jerry Whittaker or Frank Unruh. It was a very unforgetable trip in my memory. We visited stations from Nome to Homer and to some of the far reaches on the Bering Sea plus stations in the 'Banana Belt' (Juneau, Cordova, Annette) en route south.

SOWP member Frank Unruh moved to Grand Junction, Colorado upon retiredment. He became a Silent Key June 26 1980. Jerry Whittaker a real "Alaska Hand' who first visited Alaska circa 1924 on the Windjammer City of Sydney and XYL Marge live in Santa Rosa and we see them often.

We Salute -



We think it is time to honor our brother 'brass-pounders' who volunteered for service in the 'wide-blue-yonder' and have flown on assignments and missions (some extremely dangerous) all over the world.

This was especially true of those who flew during the war years when many of the ground navigational aids were blacked-out or who could not use normal Nav-aids for their own safety. Not all of these were in military service as much of the support flying was by contract operators with civilian crews.

FLIGHT RADIO OFFICERS (FRO's) command our respect for the demanding and often dangerous assignments they accepted. Many of them faced unpredictable weather (fog, ice, snow, hurricanes and violent weather) unreported because of communication 'blackouts' etc. Many of our members were posted on "Pathfinder" trips or helped to pioneer the overseas trade-routes of the world. We salute them. They were a brave and dedicated group of professionals.

EDITOR, WILLIAM A. [BILL] BRENIMAN VISITING AIRWAY STATION, POINT BARROW, ALASKA

SOCIETY OF WIRELESS PIONEERS INC

Epic Flights That Made History

DATE OF FLIGHT	PILOT	NATURE OF VENTURE - [FLIGHT]
1900 - Dec. 17	ORVILLE WRIGHT -	World's first powered flight of heavier than air machine. Place: Devil Hill, N.C. Plane flew 120 feet. Elapsed time 12 seconds.
1903 - July 25	LOUIS BLERIOT	Flys across English Channel. Flew nonstop from Barraques near Calais to Dover in 37 minutes. First to cross Channel by air. Flew a tractor type monoplane with 25HP Anzani Engine.
1910 - June 13	CHARLES K. HAMILTON	Flew first round-trip New York to Philadelphia and return. Distance 150 miles. Time 3 hours 27 minutes. Nicknamed the "Connecticut Balloonatic".
1910 - Sept. 28	MAURICE TABUTEAU	Flew across Pyrenees Mountains in Spane from San Sebastian to Biarritz (Altitude 9856 feet) Set world's endurance record a short time later by staying aloft for six hours.
1911 - Jan. 25	JEAN BIELOVUCIC	FIRST CROSSING OF ALPS. Flew a Nieuport monoplane from Brig Switzerland and landed at Domodos ola Italy - 26 minutes elapsed time. Bielovucic was a Peruvian pilot.
1911 - Aug. 14/25	HARRY N. ATWOOD	SET NEW CROSS-COUNTRY RECORD - St Louis to NY, 1266 miles en route - Time 28 H 53M. (11 stops enroute) Atwood won $10,000 prize money. Airplane was a "Baby Wright" biplane.
1911 - Sept.17 to Nov. 5th.	CALBRAITH PERRY RODGERS	makes first successful crossing of the U.S. piloting the "Vin Fizz" a Wright bi-plane. Time aloft 82H 14 M crash-landings enroute - total time taken 49 days. Awarded Gold Medal by the Aero Club of America
1912 - Aug. 18	EDMOND AUDEMARS.	FIRST AIRPLANE FLIGHT PARIS TO BERLIN. Plane used was a monoplane built by Alberto Santos-Dumont of Brazil. Flight was undertaken as a "good-will" flight between France and Germany.
1913 - Sept. 23	ROLAND GARROS	FIRST FLIGHT ACROSS THE MEDITERRANEAN from St. Raphael to Bizerte a distance of 558 miles. Time 7H 37M. It was a record overwater flight.
1919 - May 15/31	Lt.Cmdr ALBERT C. READ USN	- FIRST CROSSING OF ATLANTIC - W/E. Trio of NC's left Trepassey Bay Nfld but only NC-4 Piloted by Walter Hinton finished,landing at Plymouth England 31 May - 4320 miles. Time 53H 58M. Stops made at Hortz Azores, also Ponta Delgado, Lisbon and Ferrol. Large Naval support team assisted in flight.
1919 - June 14/15	JOHN ALCOCK & ARTHUR W. BROWN.	FIRST NON-STOP ACROSS ATLANTIC (W-E) St. Johns Nwfld to Clifden, Ireland Plane: Vickers Vimy bomber. Time 10H 27 M. 1960 miles.
1919 - Nov.12/Dec,10	SIR ROSS SMITH	ENGLAND TO AUSTRALIA. Time: 29 days. Distance 11,500 miles. Crew of 4 including pilot.
1921 - April 1	ADRIENNE BOLAND	FLEW OVER ANDES FROM ARGENTINA TO Santiago Chile. French Aviatrix. Mlle. Boland took over 10 hours to reach Santiago at altitudes of nearly 13000 feet.
1923 - May 2/3	OAKLEY C. KELLY and JOHN A MACREADY	FLEW NON-STOP ACROSS THE U.S.A. Plane: Fokker T-2 Monoplane. USA Service made the crossing of 2500 miles in 26H 40M.
1924 - Mar.17/Sept. 28	GROUP FLIGHT U.S. ARMY AIRMEN	— AROUND THE WORLD. Starting point Clover Field, Santa Monica, CA. Only 2 of 4 planes starting race completed of 27,528 miles. Total time aloft 15 days 11 H 7 M. Planes: Single-engine engine Douglas Cruisers.
1925-26 Nov/Mar.	SIR ALAN J. COBHAM	- Flew London Cape TOWN VIA CAIRO . First pilot to complete journey flying single-engine DH-50 biplane
1926 - May 9	RICHARD E BYRD & FLOYD BENNETT	- First trip over North Pole in Fokker trimotor monoplane. Flew from Kings Bay Spitzbergen over North Pole and returned in 15H 30M flight of 1545 miles.
1927 - May 20	CHARLES A. LINDBERGH	- Made famous SOLO FLIGHT FROM NEW YORK TO PARIS. Plane: Ryan Monoplane. Time 33H 30 Min. Distance 3600 miles Roosevelt Field to Le Bourget. Many amazed at pin-point accuracy of his navigation.
1927 - June 4/6	CLARENCE D. CHAMBERLIN and CHARLES A LEVINE.	FIRST TO FLY NON-STOP NEW YORK TO GERMANY. Plane: Bellance monoplane "Miss Columbia". Time: 42 H 45 M; Distance 3905 miles from Roosevelt Field NY to Eisleben.
1927 - June 28	LESTER J. MAITLAND and ALBERT HEGENBERGER	- FIRST NONSTOP FLIGHT CALIFORNIA TO HAWAII. PLANE: Fokker tri-motor, "Bird of Paradise". Time: 25H 49 M; Distance approx 2400 miles.
1927 - Oct. 14/15	DIEUDONNE COSTE and JOSEPH le Brix.	(French) - FIRST NONSTOP ACROSS SOUTH ATLANTIC. Route from Senegal, Africa to Port Natal, Brazil. Time 19 H 50 Min. Distance about 2000 miles. Plane: Breguet XIX biplane with 600 HP Suiza Eng.
1928 - April 12/23	Trio - James Fitzmaurice, Hermann Koehl and Guenther von Huenefeld.	First E/W crossing of Atlantic. Flew Junkers Monoplane Bremen. Time 37 H. Distance about 2070 miles
1928 - April 15	SIR HUBERT WILKINS and CARL BEN EIESON	- FIRST FLIGHT ALASKA TO EUROPE VIA ARCTIC OCEAN. Plane: Lockheed Vega, Time 20 H from Point Barrow, Alaska to Spitzbergen.
1928 - May 31/June 8	QUARTET: CHARLES KINGSFORD SMITH, CHARLES T.P. ULM, HARRY W. LYDON and JAMES WARNER.	U.S.A. TO AUSTRALIA Flew Fokker tri-motor . Time 83 hours 11 M. Distance 7,200 miles.
1928 - July 3/5	ARTURO FERRARIN and CARLO P. DEL PRETE	- ROME TO BRAZIL. Italian flyers made trip across the South Atlantic in a Savoia-Machetti S-64 seaplane. Distance 4460 miles Rome to Natal. Time: 51 H 59 M.
1929 - Nov. 29	RICHARD E. BYRD and BERNT BALCHEN	- FIRST TO FLY OVER SOUTH POLE. Flight made in Fokker trimotor from Little America and return. Distance about 800 miles. Time over South Pole 8.55 AM.
1931 - June/July 23/1	HAROLD GATTY AND WILEY POST	- NEW RECORD ATW. (AROUND THE WORLD) TIME 15,128 Miles. Plane: Lockheed Vega. TIME: 8 days 15 H, 51 Min.
1931 - Oct. 4/6	CLYDE PANGBORN and HUGH HERNDON	- FLEW NON-STOP JAPAN TO THE US. Distance 4465 Miles. Time: 41 H 13 Min. Plane: Bellanca monoplane " Miss Veedol". Route: Sabushiro Japan across Aleutians to Wenatchee, Washington.
1933 -Aug. 5/7	PAUL CODOS and MAURICE ROSSI.	- LONG DISTANCE RECORD 5657 Miles non-stop.Plane: Bleriot-Zapata monoplane powered by a Hispano-Suiza engine. Route: Floyd Bennett Field NY to Ryak, Syria. (Franch Pilots)
1937 - July 12/14	GROMOV, DANILIN and YUMASHEV	(Russian) - SET DISTANCE RECORD 6305 miles non-stop. Plane: Single engine RD 25-1 flew from Moscow across the North Pole to California in 62 H 17 Minutes.
1938 - July 10/14	HOWARD HUGHES	- Sets new record ATW (Around the World) from New York across Russia and return NY in 91 H 14 Min. Plane: Twin-engined Lockheed.
1946 - Sept. 26	Cmdr. THOMAS D. DAVIS and crew	- SET NEW DISTANCE RECORD. Perth Australia to Columbus Ohio - 11.236 miles nonstop Time 55 H 17 Min (flight). Plane: U.S. Navy - Lockheed P2V-1 Neptune with twin 2500 HP Wright Cyclone engines.
1949 - Feb 26/Mar. 2	CAPTAIN JAMES GALLAGHER and Crew.	FIRST NON-STOP AROUND THE WORLD. DISTANCE 23,452 miles. TIME 94H 40 Sec. Plane named "Lucky Lady II" Route started/finished at Carswell Air Force Base in Fort Worth, Texas.
1957 - Jan 16-18	Trio of 3 Boeing B-52 bombers USAF Strategic Air Command under command Gen. A. J. Old Jr.	FIRST NONE STOP JETS ATW Time: 45 H 19 Min. Distance 24,325

Researched by W. A. Breniman

President Reagan's Proclamation

On November 21 1783, the first manned flight in the history of mankind took place when Etienne de Montgolfier's hot air balloon carrying two passengers soared aloft at LaMuette, France. The belloon sailed over Paris for 25 minutes and traveled five and one-half miles.

Early this year, President Reagan on the United States issued a proclamation stating, in part:

"This epochal flight fulfilled mankind's desire, as old as the myth of Icarus, to become airborne. But it was also something more than the fullfillment of a dream. Montgolfier's achievement was a concrete demonstration of the power of technological know-how when coupled with the yearnings of the human spirit. For the first time, man had freed not only his imagination but his physical self from the forces of gravity. With every advance, our imagination and knowledge have leaped forward - from Montgolfier to the Wright brothers through the moon walks and space shuttle.

"In the 200 years since that first flight, man's quest to understand the unknown has resulted in our ability to fly higher, faster, safer and farther. We race the sun as we move from continent to continent in a matter of hours. We have vastly multiplied commerce and communication among far flung peoples. We have flown 250 thousand miles to explore the surface of the moon, and, with this unprecedented triumph of spirit and technology, changed forever our view of the Earth. She is a delicate blue jewel in the darkness of space.

"In recognition of 200 years of progress around the globe in manned flight, the Congress, by Senate Joint Resolution 270, has designated the year 1983 as the Bicentennial of Air and Space Flight. I am proud to have been named Honorary Chairman of the United States Organizing Committee, which will plan our participation in activities at home and abroad to commemorate the Bicentennial. I view the celebration as an opportunity to increase public awareness of our Nation's achievements in aviation and space flight and to rededicate ourselves to the spirit of excellence which has brought us so far so fast.

"NOW, THEREFORE, I, RONALD REAGAN, President of the United States of America, do hereby designate the year beginning January 1, 1983 as the Bicentennial of Air and Space Flight. I call upon all government agencies and the American People to observe this year with appropriate ceremonies and activities. "

---From DOT-FAA "WESTERN REGION INTERCOM"

The Common Denominator

Bush Pilots in Alaska

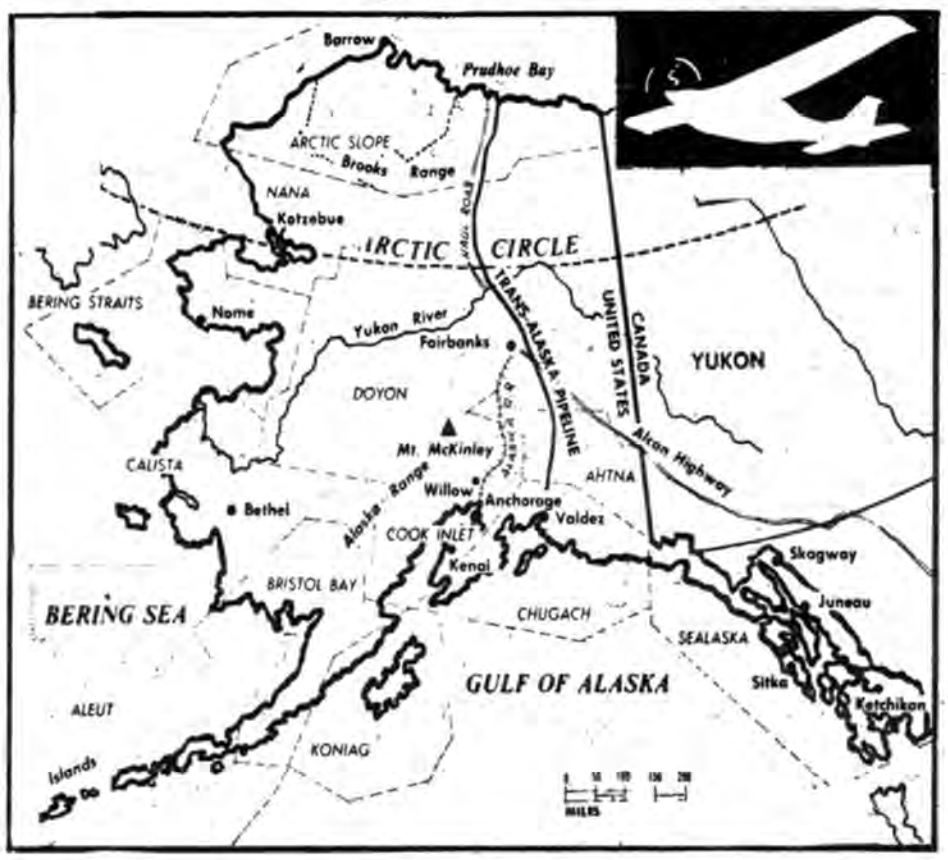
By —Al. E. Horning

Bill:

Being an airborne "sailor" throughout my career, I'm afraid I can't come up with the type anecdotes you describe above, but here's a coupla things struck me funny at the time.

When McGee first decided to radio equip his fleet of single engined bush planes in Anchorage in about 1935 (also put in ground stations at Anchorage, Rainy Pass and Iliamna), he kinda let me take care of it for him. Naturally, I gave high priority to rigging up my own Bellanca on floats first, even tho I only had a ham license, plus the desire. In connection with a trip to Washington, D.C. for the outfit, I also went up to Long Island to see if I could talk Bill Lear into building a receiver better suited to our aeronautical needs in Alaska. That wonderful guy almost overnight came up with what later became known as the Lear RCBB receiver. The transmitter used a couple of "iron" 6L6's and a plug in crystal. I installed the rig on a little spring mounted shelf under the instrument panel on the co-pilots side and was so proud of the fact that I'd drilled several sets of holes in the shelf rim to hold spare xtals. Well, the RI came thru from Seattle about then on his once-a-year look see at radio doings in Alaska. Somebody, (I always suspected some of the competition) told him I'd installed radio in my airplane. He came down to the office and asked me to take him out to Lake Spenard to show him the installation, saying if it was OK he'd forgive me for not having a commercial license (by that time, I had a radio-telephone 3rd too). Anyway, I completely forgot that I'd stuck a spare 3940 crystal in my fancy holder along with the other spares. When old George Wiltse saw that he said, "What's that crystal doing in here?" I said, "I'm a licensed ham, too, and I'll darn sure use it if I'm down out in the boondocks and can't raise anybody on the aeronautical band." That was before the days of 3105, 4495 and 6210 up there. Ol' George just grunted and said, "well, I suppose that COULD be called an emergency." He was a real guy!

Years later, after I was with CAA, I was enroute from Seward to Seattle to pick up another airplane, so I'd taken all my gear along, including a little battery portable range receiver the outfit had provided us. We had just finished building the Yakutat SRA, but as I remember it wasn't yet commissioned. When the old SS ALASKA got out in the middle of the gulf, I thot I'd take the portable topside and see if I could distinguish the south course. I had it turned up pretty loud up on the boat deck, and it



happened old John Nord, the skipper, was out taking his morning constitutional. When he heard the range signal, he come over and said, "Vot's dat ting?" Being new in the outfit, and impressed with my new knowledge, I went into quite a discourse on low frequency ranges and how they were used. He soon came back with "Sparks" (don't remember who) and made me repeat the whole thing. By that time we were crossing the south course and I told him if he'd let Sparks run the ship to keep that steady tone, he'd end up right in Yakutat bay. I don't think the old boy believed me, but Sparks did!

This doesn't have anything to do with wireless, per se, but we always got a kick out of it. When the Navy realized WW-II was imminent, they made all the Alaska steam skippers Lieut-Commanders in the Reserve, including one "Squeaky" Anderson, skipper of the STARR, mailboat that had the contract from Seward out the Aleutians. By the time the shooting started, Squeaky was on the beach, so he got himself ordered to active duty and the Navy made him port captain at Dutch Harbor. When I took Buzz McKean and Les Marriner out there in our CAA amphib to see how the proposed OFACS was coming, I had to see Squeaky to get our passes over to Unalaska, which we wanted to see. In the course of the visit, I asked Squeaky, who had been notorious for dealing in "hot" fur in the Aleutians, how he liked being in the Navy. He said,"Yah, Al, she's a pretty gud, but you gotta be friends wit dose Got damt Coast Guardsmen now!" Later on, Squeaky got to be the Navy's boss beach master in the whole South Pacific, and ended up as a Commodore.

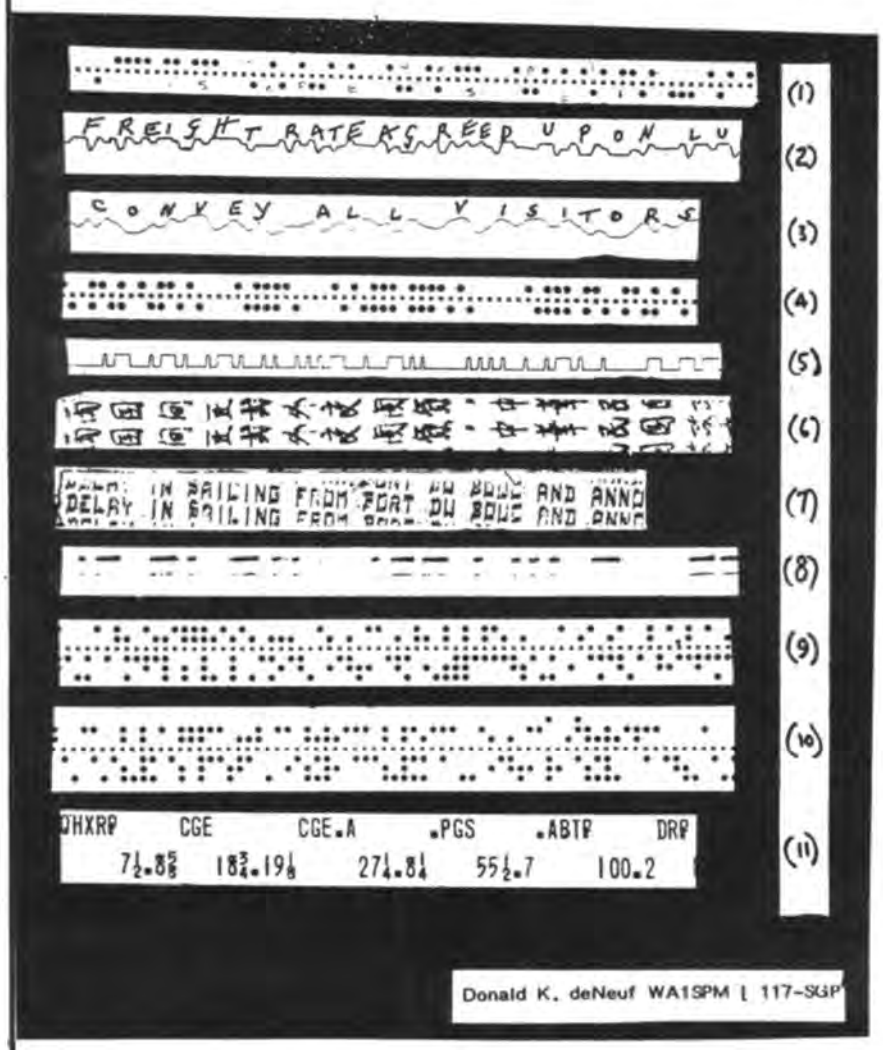
Now that I've finished this, it sure doesn't look like much, compared with your usual run of SOWP stories, but it's the best I can come up with!

-73- AL

"THE PHONE ON THE RIGHT IS OUR HOT LINE TO THE WEATHER BUREAU."

TALES OF THE TAPES

By- Donald de Neuf



(1) Submarine cable transmitting tape. Block signals...dots "UP" --- dashes "DOWN"

(2) Outgoing syphon recorder tape showing block signals. (Cable)

(3) Syphon recorder tape of incoming signals from France. Signals are extremely "rounded" due to the low-pass (Cable) filter effect of the long cable. Skilled operators had little difficulty in translating the undulations.

(4) Radio Telegraph Wheatstone transmitting tape. Perforations on the top side of the tape create "mark" or key-down conditions. Holes on the bottom release the mark condition.

(5) Radio Telegraph receiving syphon recorder tape. Dots and dashes are clearly indicated by the pen moving "UP" for "mark" and "DOWN" for space.

(6) Facsimile tape employed by Press Wireless, Inc., to bring ideographic news reports for Japanese and Chinese newspapers in the United States. Strip is in Chinese and reads... "formal diplomatic relations between two countries. The Government of the Republic of China....

(7) Hell Schreiber tape. Highly successful on radio telegraph circuits. Synchronization was no problem. As one line of print began to slide off the tape a second line above or below began to print. Transmission was by means of a commutator keyboard and received by a spiral scanner drum.

(8) Old Bunnell morse inker tape.

(9) Five level Teletype tape.

(10) Six level Teletypesetter tape to operate line-casting machines from wire line networks.

(11) New York Stock Exchange Ticker tape. This tape was produced from a Press Wireless shortwave signal over a New York - San Francisco circuit. At San Francisco, the signals were automatically repeated back to New York for confirmation.

75EME ANNIVERSAIRE DES ZEPPELIN

"DENNE" GRAF ZEPPELIN CALLING

by D. K. deNeuf, WA1SPM

One of the most famous dirigibles, or "lighter-than-air" rigid airships was the Graf Zeppelin, named after the Germain designer Count Zeppelin. ("Graf" being "Count" in German.) The airship was actually a "transoceanic luxury liner in the skies", complete with accommodations for twenty elite passengers and was equipped with the best of china, linens and silverwave for serving its sumptuous meals - even a grand piano was aboard for entertainment. The crew numbered 41.

The Graf made numerous historic trips to South America, Africa and even to the North Pole. But the most noteworthy was its trip around the world in 1929. On its voyage across the Pacific from Tokyo to the USA, I was the ground communicator at RCA in San Francisco. Shown below is an actual undulator ink recording of *DENNE*'s CW signals I made at 1236am PST 24 August 1929. (I don't need to unpack the press message shown on the tape - the old timers will read it directly.)

The Graf, despite its load of 3½ million cubic feet of hazardous hydrogen for lift never had an accident. Not so with a sister ship the Hindenburg which caught fire and burned at Lakehurst, New Jersey, May 6 1937. Thought for years to have been an act of anti-Nazi sabotage, it has since been pretty well proven to have been caused by a fire-bomb planted by a crew member who had timed it for the scheduled arrival at the Lakehurst Naval Station. Delay in landing, the bomb went off just as the ship was approaching the station. The arsonist had rigged things so, he hoped, his wife could collect his insurance while he escaped and went into hiding. He was never found.

The famous US stamps issued honoring the Graf are shown in replica below. Incidentally in the philatelic world today they sell for well over $6500 a set!

Of great interest are tapes made of the radio signals from the Graf Zepplin August 24 1929 by Don deNeuf at San Francisco while the ship was approximately half-way across the Pacific Ocean. . These will be published at a later date.

RADIO SOARS ALOFT

Memoirs de George Gordon Farmer—W6OO

Little is said about pioneer aircraft wireless.

Such experience as I have had is meager. World War I, in France, artillery fire was sometimes directed from aloft, by a series of numbers sent to the battery below, correcting the range with each salvo.

Our aircraft equipment consisted of a wind driven six-volt generator, a spark coil and gap, a trailing aerial which was directional.

A four gun salvo would be fired, the aircraft pilot would plot the target, turn around and head for the battery. This was when the pilot sent the correctional numbers for the next salvo.

Meantime the wireless operator who was located just aft of the guns had reset his catwhisker to a sensitive spot on his crystal so that he could copy the data between rounds.

My next experience with aircraft wireless---Western Air Express, 1929-30, also meager. A short stay at Las Vegas, some months at Wichita, some at Albuquerque. My title with the company was the longest in the world, the pay about the shortest. Assistant Chief Operator in Charge of all Stations East of Los Angeles, Including Midcontinent---$160 a month, seven days a week, all holidays at work, no vacations. I was among several who were fired because of efforts among the personnel to improve working conditions. We were described among the management as Commies. Hi. May I mention one of the salient happenings of my tenure in office?

CASE OF MISTAKEN IDENTITY

Herbert Hoover Jr.---W6ZH---son of the then President of the United States, performed as Chief Engineer for the embryo Western Air Express in 1929. He designed and helped build the communication transmitters and receivers used by the wireless operators employed by the company. Occasionally he would also install these rigs at out-of-the-way airports, flying from one place to another in the airline's aircraft, principally the Fokker F-10.

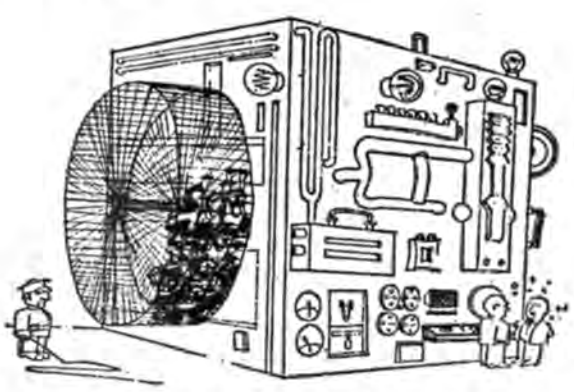
This year a stupendous murder mystery developed in the Los Angeles area. A wireless operator named Tallman became suspect of killing a woman---after her body had been discovered hanging in his closet. Right after suspicion pointed his way authorities took it into their heads to apprehend him. This was when tallman disappeared from sight. In fact, he was never heard from again.

A terrific search was instituted, however.

One day H. Hoover---affectionally known as Herb---stopped at Kingman, Arizona, where the company had two wireless operators stationed. One of the operators, after seeing Herb alight from the plane, immediately called up the local sheriff and reported that Tallman was at the airport. The operator had mistaken Hoover Jr. for Mr. Tallman, the wanted man.

Years later, the operator who had made the error hung himself from the catwalk above the 24-foot tunnel of Dam Nr 2 of the Los Angeles County Flood Control, where he was employed as radio operator.

Later, I served in this same capacity at Dam Nr 2---but didn't hang myself.



"THE DAMN THING CQ'S, QSL'LS, AND SITS IN THE CAN FOR HALF AN HOUR."

ANOTHER MISTAKEN IDENTITY

To divert attention from aircraft wireless to broadcasting where many wireless operators were prone to hide out during countless years, may I mention that among the early day broadcast stations in Los Angeles was KFSD, outlet for the outpourings from Angelus Temple?

The licensed operator (telegraph licenses were used solely at BC stations then), manipulator of dials and switches, was ex-seagoing radio operator Kenneth Ormiston who, while aboard the S S Ventura on the Sydney run, introduced in 1914 to VIS Sydney Radio and the Aussies in general, De Forest's Ultraudion circuit and the Audiotron, a California made tube with two filaments.

Mrs. McPherson was the world's---according to her following, the finest since Christ---most outstanding evangelist. Two large rooms, next to the radio transmitter where Ormiston worked, already houses crutches, canes, wheel chairs, iron supports for broken necks, backs and legs, discarded by followers cured forever of their ailments when Faith entered their lives, it is said.

For some reason Mrs. McPherson antagonized the newspaper world, those of the yellow press who, when headlines became scarce, created them if possible.

Abruptly Aimee Semple McPherson filled front pages of the local press. She had dropped from sight. In fact, last seen, she waded the breakers of the local seacoast, heading outward toward deep water. Thus Aimee, world's greatest evangelist, disappeared, according to the news.

Her followers, worldwide, mourned by the millions.

Newspapers and staffs vigorously searched for clues. Reporters climbed water spouts, entered stealthily second story windows, ransacking the areas about the Temple. Peeping as no Peeping Toms had ever peeped before. Bigger headlines bloomed.

They found a motive for it all, too---they thought. Or did they? Operator Ormiston had also sunk out of view---Radio Station KFSD suspending operations. Reporters gleefully discovered that the evangelist and her radio operator made big news.

To make matters more interesting, while tension mounted, Mrs. McPherson, in a wholly unexpected announcement, was reported walking blithely in a remote desert region, adjacent to the Mexican border, akin to Arizona---returned to Earth. Her many followers were overjoyed.

News reporters---unused to miracles---concluded that no woman could enter the tides and breakers on a beach near Santa Monica and swim several hundred miles overland---dry land---to appear in good health alone on the Mexican border.

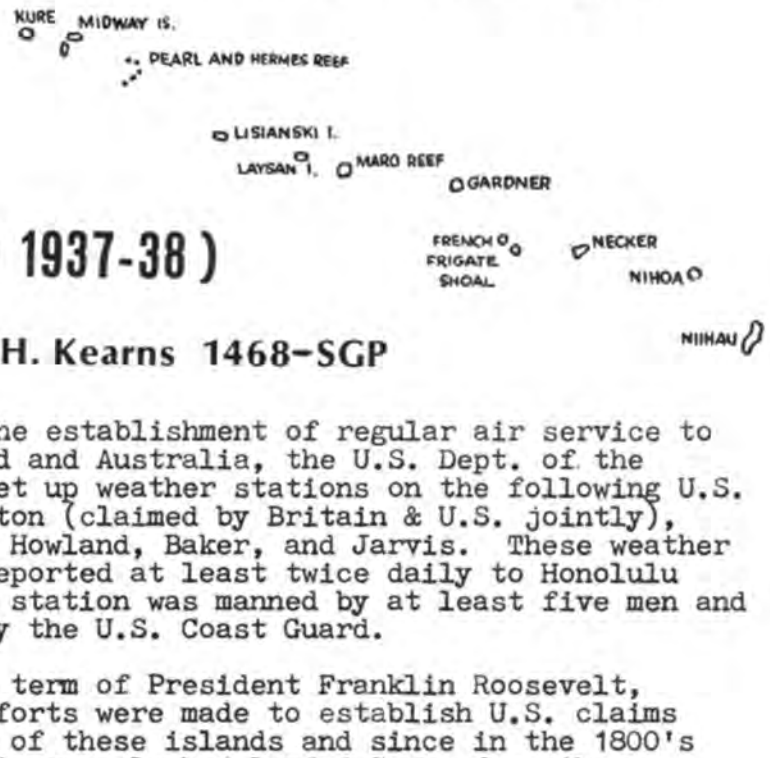
Here was where the mischievous news reporters, near sighted and eyes peering thru magnified lenses, found that two disappearances came to one mathematical result. They coupled the names of Ormiston and Mrs. McPherson together.

Knowing these two people---Aimee Semple McPherson and Kenneth Ormiston---I am qualified to say that those newspaper reporters and their editors who blared that infamous allegation thruout the world are blamed liars---and should be sent to bed without their suppers.

But maybe it's too late. And thus ended another great saga of radio.

********** FROM "65 Years On The Air."

Weather Stations on the Line Islands



(Period 1937-38)

By- Max H. Kearns 1468-SGP

Prior to the establishment of regular air service to New Zealand and Australia, the U.S. Dept. of the interior set up weather stations on the following U.S. Island Canton (claimed by Britain & U.S. jointly), Enderbury, Howland, Baker, and Jarvis. These weather stations reported at least twice daily to Honolulu NPM. Each station was manned by at least five men and serviced by the U.S. Coast Guard.

During the term of President Franklin Roosevelt, certain efforts were made to establish U.S. claims to certain of these islands and since in the 1800's several U.S. vessels had loaded Guano from these islands and in lieu of other claimants, the U.S. claimed them. The U.S. was subsidizing Pan American Airways during this period and they were very much interested in weather conditions in this area. One can ascertain by looking at a map of the area that these islands lie along the Equator. The Island farthest to the east is Jarvis.

The interesting thing about Jarvis is that several of the Hawaiian members of the weather crew had discovered by diving offshore a number of old cannon, undoubtedly from some sailing ship loading Guano that had been wrecked in a storm. They had lined these old cannon up on the beach and they presented an interesting sight.

The USCGC Taney on which I served as CRM, normally made tri-monthly voyages to service these islands. My particular job was to check their radios and also their power generators.

I recall one instance when Jarvis had radioed that they were running short on food, as indeed they were as when we arrived all the food that remained consisted of a sack of onions. They had been subsisting mainly on crayfish and tern eggs. I must remark that after sampling one of the tern eggs that they were very good. Describing these islands with the exception of Canton, they were all much the same, that is to say, very flat (probably the highest elevation would be about eight feet, usually about thirty or forty acres in size and absolutely covered with nesting sea birds, terns, gooney birds, sea gulls and you name it.

On one of our service runs we touched at the island of Palmyra. At that time there was one habitation on Palmyra consisting of a small thatched hut abandoned, no personnel on the island. Later during WW2, the U.S. Navy built a large runway on Palmyra. One thing this island did have was cocoanut crabs. These were very good eating and we gathered quite a few. Am enclosing a picture of part of the motley crew that went ashore there. We all acquired a good case of sunburn. We also touched at Christmas Island, which was populated and had quite a grove of cocoanut trees.

These voyages by the Taney were very popular in certain army and navy circles and we usually had at least fifteen or so army and navy air force officers aboard for the cruise.

These trips to the Line Islands will always play a prominent part in my memories--a day after leaving our home port, Honolulu, the boatswains mate would pipe, "uniform of the day", which consisted of scivie shorts and shirts. Movies nightly top-side and with a million stars and the "Old Southern Cross" overhead. The weather for the most part was usually very calm.

The China Clipper made the first run for Pan-American Airways, sometime during or shortly after this period to Japan I believe. When WW2 broke out and we became involved after the bombing of Pearl, these islands were released of the personnel, however, on Jarvis one morning shortly before they were taken off a Japanese submarine surfaced off-shore and shelled the small shacks that had been occupied by the personnel. As I recall, one man was killed, the others fortunately had dug a small slit trench in which they huddled.

FRENCH FRIGATE ISLAND [French Frigate Shoals] taken by member Max Kearns while serving on the USCGC TANEY circa 1937, Pre-WW-II.

"THE LINE ISLANDS" ... "are for the birds" ... says Max. "Here we trespass on bird domain and they tell us about it in no uncertain terms."

Here each bird claims its own bit of terra-firma for nesting privileges and woe be unto anyone who tries to 'claim-jump'. This picture was snapped on Jarvis Island in 1937 by Max Kearns.

They had no armament, except a handful of .30 Cal Springfield rifles. Fortunately the submarine after a desulatory shelling, moved on without sending a party ashore.

----- * -----

Dear Bill:

I am not sure that this is newsworthy, if you decide it is not, deep six it. Am including a couple of pictures of French Frigate Island. This Island was also set-up by the navy with runways after the outbreak of hostilities.

I regret I do not have photos of Canton Island. This was a truly beautiful little atoll and the enclosed waters had been cleared of coral by natives brought in from Guam, who had considerable pearl diving experience. Pan American Airways built a small Hotel on Canton, but I understand it was destroyed by fire in 1938 or 39 and then rebuilt. Canton was the only island in the group that had palm trees, and then only a dozen or so.

I can truthfully say that we had a crew of "SUPER* SHELL*BACKS" aboard. As we criss-crossed the Equator at least five or six times each voyage, after my first introduction to the realm of Neptune I grew to enjoy the ceremonies, which were held each voyage and accepted good naturedly by our usual group of high-ranking Army-Navy personnel.

My only reason for forwarding you this article was because I note that you have plans for including a journal on aircraft, etc., probably in your next issue of the Sparks Journal.....BEST 73,

MAX H. KEARNS

PT. TO PT, WITH EASTERN AIR LINES

By Howard H. Falk

Eastern Airlines was for many years a heavy user of point to point CW for airline traffic so were several other domestic carriers. I went to work for Eastern in the spring of 1940 after leaving Santa Elena/WLEA as first assistant radio operator, George Ahrens, an SOWP member was chief. I flew free to Miami to take the circuit test and after completing it stayed in Miami/WEEM, as a trainee for a few months then tried to get to Newark, N.J. or Laguardia Field because my wife to-be lived in N.J. I was sent to Washington D.C. at the old field where the Pentagon is today, the call letters were WEEK, shortly after I arrived there operations were shifted to the new field to be known as Gravelly Point, later, Washington National. I got married and stayed in D.C. for about a year then transferred to Laguardia Field, call letters WEEP, where I stayed until spring of 1942 when I took a position with American Export Airlines (more about this later) as a flight radio officer. When I started with EAL at WEEM I was a "student operator", I believe I started at $100 per month, when I was promoted to regular operator I made from $125 to $135 per month and when I left in 1942 I was making a big $175.00. We all worked a 48 hour week and around the clock on shifts not watches. The Radio OPS punched TTY on the night shifts even though we nearly always had female teletype operators working with us.

Airline radio traffic in those days was extremely heavy both on C.W. and on L.L. T.T.Y., in addition smaller stations at smaller airports didn't have C.W. and had to put their TFC on A3, needless to say with QRN, it was a difficult situation at times. At Wash. D.C. WEEK, we handled a large amount of A3 TFC but at N.Y.C. WEEP, none. All operators worked split-phone watches and on the mid-watch in the large stations we had one or two aircraft voice frequencies on loudspeakers, these could be patched into the "cans", the mike was foot operated and swung above the mill. . . . . .Aircraft always took precedence over any other TFC.

TFC on C.W. was fantastic, kept us busy all watch. had to call the C.R.O. to get a break to go to the bathroom, he would grab the phones and start on the next MSG without breaking the sending operator. QTC 60 or 70 was common and the only breaks allowed were for flight plans or operations clearance (O.P.C.) or some other kind of a priority message.

All message preambles included the opr. sine, number, date, time, and ck. I believe that before I left they no longer had a word count, another trick all CW oprs had to learn in order to keep working, was to "endorse" their sent messages while sending them. The MSG was put in the mill with the next message to be sent right in back of it, the MSG was rolled out so it could be read and the operator would type his sine and the time being sent (E.G. "FK Ø922A") while sending the MSG. By the way instead of "TKS" we used "TN", don't ask me why.

A lot of the airline C.W. oprs were not former sea-going oprs but rather came right from ham radio. You had to be a good, accurate, readable operator or you did not last. I am the first to admit that we threw in a lot of dots and fast but no one complained and we handled an awful lot of TFC. I don"t recall much if any automatic equipment such as Boehme or Klein-Schmidt tape but I do recall one of our Hotshots getting his license suspended for sending an off-color joke over the air and at high speed. I know we sent lots of weather manually.

Several radio operators and printer operators got themselves into trouble by sending unauthorized stuff over the printer lines, we used teleprinter teletype models 15 and 19 with the typing reperforator. These operators thought there were no way to get caught. Take any one of our three main RTTY circuits, every message would come out on every printer at the same time, it was a waste of teletype paper but that is the way it was. . . . .When traffic handling got quiet after midnight some operator would print something to start the ball rolling, for example: A station would send "GO". Another station might print "TO", another printer opr would send "HE", then an-

other "LL". There was a whole rash of these incidents but the Telephone Co. won out and pinned down the stations, but not necessarily the culprits. The result was a stern warning from the circuit supervisor in Miami "Knock it off or else". I believe one of these warnings was signed by our old SOWP member Lee Machen who was circuit supvr in years 1040/1942 or 1943.

We had somewhat parallel incidents on C.W. when the circuits were quiet. Assuming a Pt. to Pt. frequency late at night and TFC is at a minimum. All of the stations with the "WEE" prefix sounded nearly the same, WEEM, WEEK, WEEP, WEEJ, WEEC, WEEO, WEEA, so one could hit the key and be reasonably sure of not being "recognized", not so with WOET, WOEN, KSAT, KBRN they had distinctive signals of their own, pure C.W. true but one could pick them out individually. WEE? would send something and the other WEE? stations would follow suit, but then again you didn't often get bored, you were too busy.

. . . . . .Shortly after Pearl Harbor, radio operators were getting difficult to hire. A radio operator could make much more money on a merchant ship. Radio operator schools across the country were encouraging people to become radio operators and most especially, females. In 1942, Eastern Airlines hired some girl operators, I am not sure how many but I believe there were only a handful. We had one girl at WEEP/NYC and she was very good for a newcomer, the other females on the circuits turned in creditable performances also.

EASTERN AIRLINE RADIO STATION CALL LETTERS
AS OF 1943

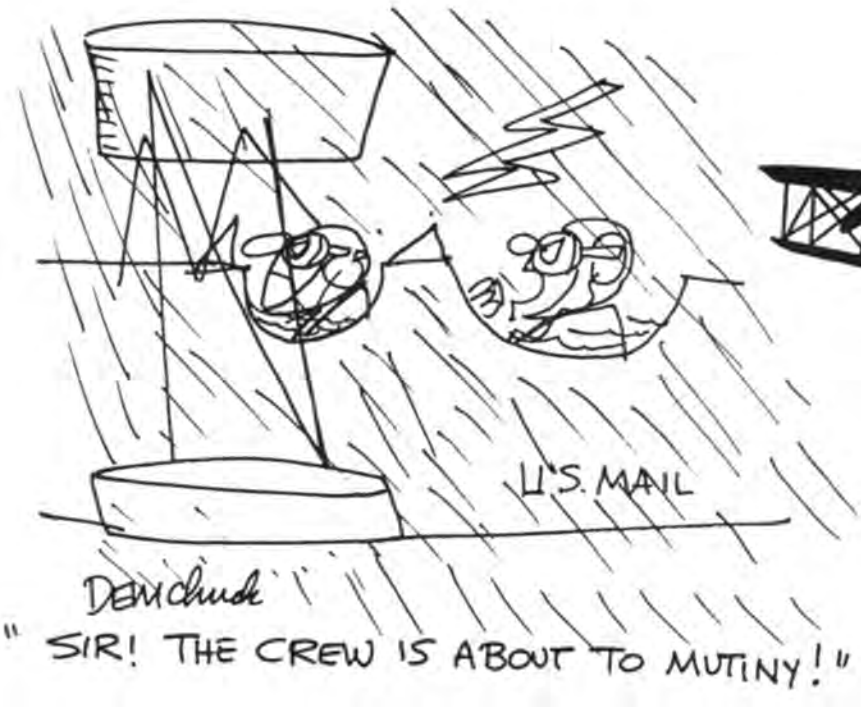
WEEA----------ATLANTA, GA.
WEEC----------CHARLESTON, S.C.
WEEJ----------JACKSONVILLE, FLA.
WEEK----------WASHINGTON, D.C.
WEEM----------MIAMI, FLA.
WEEO----------CHICAGO, ILL.
WEEP----------LAGUARDIA FIELD NYC. (ACTUALLY, TRANSMITTER LOCATION, NEWARK NJ)
WEER----------RICHMOND, VA. (NO C.W. FACILITIES)

ALL ABOVE WERE C. W.

OTHER C. W. EASTERN STATIONS WERE:
WOEN----------NEW ORLEANS, LA.
WOET----------CHARLOTTE, N.C.
KBRN----------BROWNSVILLE, TX.
KSAT----------SAN ANTONIO, TX.

OTHER EASTERN TFC HANDLING STATIONS VIA A3 & NO C.W. WERE ALL THE SMALL STATIONS FOR EXAMPLE:
GREENSBOROUGH, N.C.
RALIEGH, N.C.
SPARTENSBURG, S.C. AND OTHERS I DON'T RECALL.
PLUS I THINK THE STATION IN EVANSTON, ILL. HAD C.W. BUT NOT SURE AND CANNOT RECOLLECT CALL LETTERS.

Radio operating at WEEP Laguardia Field N.Y.C. CIRCA 1941/1942 at WEEP our radio room was in Eastern Airlines hanger #8 at "LGA". Our Fixed frequency main receivers were located on Rikers Island which is out in Flushing Bay right across from the airport, one could see the Island from the hanger. Our trans-



The Bumble Bee

I hear the humble bumble bee
Is not equipped to fly
But yet it manages each day
This problem to defy
It seems its wing-weight ratio
Is absolutely wrong
In spite of this the bumble bee
Goes buzzing right along.
When someone says "It can't be done
Think of the bumble bee
He overcomes his handicap
And flies just fancy free
So when you hear discouragement
Just set your sights on high
Make up your mind and spread your wings
And get out there and fly

By Stuart Richardson

(Continued from Page 10)

mitters were located at Newark Airport which was about 15 miles to the west. Keying and on/off controls were by A.T.T. Long Lines, many times after heavy rains the keying would get a little tacky. We had a technician on call in Newark to take care of the transmitters which were 2KW Wilcox and/or Aeronautical Radio Airline specials. If a transmitter went out, we would call the Newark technician. If a receiver went out then we had to trek over to Rikers Island which was a prison site for New York City. It was almost an hour drive and boat ride to the Island. Once on the Island we would have to sign in at the warden's office and then a trustee would drive us to the station via a dirty dirt trail that ran between huge mounds of garbage and trash, Rikers Island was also a city dump. Once the repairs had been affected we had to retrace our route, the whole procedure usually took the better part of a day. In the station in Hanger #8 we had a 500 watt back-up transmitter which could only be used on air to ground voice frequencies and we had several national HRO receivers. We were only off the air once for about 12 hours when a Hudson Tubes Train jumped the track in Exchange Place Jersey City and took telephone cables including our keying lines with it.

INCIDENTAL INFORMATION

Other airlines using point to point CW were:
TWA, AMERICAN, BRANIFF AND POSSIBLY OTHERS, NOT SURE.

Some of the personnel I remember at the stations were:
MALCOLM MACDONALD, CHIEF AT WEEK (D.C.)
Met Mac 23 years later at WCC!
BERNIE O. HILTS, CHIEF AT WEEP (NYC)
CLYDE WALKDEN, CHIEF AT WEEM (MIAMI)

Some of the other operators were:
FRANK HOTOPH, ED. HEDRICK, ERIC FOTH, C.J. COX, ETC. (FAILING MEMORY).

Shortly after WW2 point to point C.W. was abandoned by the domestic airlines.

Air to Ground He was 'First'!

ELMO H. PICKERILL

FLYING SPARKS

In the age of Moon landings, space shots and solar orbits, the 'Pioneer Days' of aviation sometimes seem to belong to a past that has little meaning in the present.

It is with a trace of nostalgia that we recall that one of Americas most outstanding "Pioneers in Aviation" [and a Brass-Pounder]...ELMO NEALE PICKERILL of Mineola New York became the FIRST INDIVIDUAL to communicate from an aircraft to both ship and ground stations using C.W. code.

The date was AUGUST 4 1910 when "Pick" (or "PK" if you like) made his historical flight which took him on a round-trip from Mineola to Manhattan Beach, Brooklyn, non-stop in a Model "B" Wright biplane. The flight was made at an altitude of only a thousand feet. During the flight he established contact with a 'push-button' telegraph key with seven different stations - three of them being wireless stations aboard ships in the New York area; two coastal stations, a portable station at Manhattan Beach and a station in New York City.

The establishment of two-way communications between the sky and the ground was one of the great achievements of science, yet not widely recorded in 1910 when the citizens of the world were not very air-minded to say the least. While "Pick" was one of the "greats" in the wireless communications field, having worked with Dr. Lee de Forest, establishing stations throughout the country, also working with Marconi, Tesla, John Stone, Fessenden and Picard, He was not a pilot... that was until the obsession of finding out if wireless in an airplane could work.

"Pick" had met Orville Wright in 1909 and ask if he would rent him of of his machines and a pilot so he could go aloft to make experiments which his wireless apparatus. Wright scoffed at the idea, telling Pick there was no airplane with sufficient power to fly with two men plus a load of wireless equipt. ... It just couldn't get off the ground ! Pick THEN AND THERE decided to learn to fly. He made arrangements for lessons with Brothers' Wright. He decided that the weight of the second man displaced would enable him to carry his wireless gear ... and so it worked out.

While some experimentation went on with air/ground communications for the next decade, it was not until the establishment of the AIR MAIL SERVICE IN THE U.S. radio came into its own in aviation. It is hard to imagine operating an airline or handling the details necessary in flying were it not for the radio assist.

Elmo Neale Pickerill was born in 1885 and died 1968, the year the Society of Wireless Pioneers, Inc., was founded. At the beginning of the Century "Pick" was working the hot wireless of AP, UP. and Hearst newspapers. He was one of the outstanding men in communications when he met Dr.de Forest at the St. Louis World's Fair in 1904. Later he became identified as the Chief Radio Officer of the world's largest and most famous ship, the S. S. LEVIATHAN. The Society's Chapter in the New York area honored Mr. Pickerill by naming their chapter after him.

ANNEE MONDIALE DES COMMUNICATIONS
WORLD COMMUNICATIONS YEAR
AÑO MUNDIAL DE LAS COMUNICACIONES
1983

"SPARKS IN THE AIR"

By- Joe Di Mento 3980-V

RB-36

"Flying the World"

The sun was just showing its rim above the horizon as the Aircraft Commander acknowledged landing instructions from the Control Tower. The crew members not actively involved in flying the aircraft assumed crash landing positions as 200 tons of aluminum and magnesium settled toward 8100 feet of reinforced concrete that was the runway at Travis Air Force Base, in northern California. The memory of that first landing is as exciting today as the actual landing was, 31 years ago. It was then, as a new member of an RB-36 flight crew, that I received my first taste of being an airborne radio operator. We had just completed more than 25 hours of non-stop flying on a planned training mission of simulated bomb runs, aerial gunnery, photographic and electronic reconnaisance.

Being fresh from the Radio Operator's school at Keesler AFB, Biloxi, Mississippi, I was eager to try out my new found ability with the brass telegraph key. What an experience that was! Having never been outside of New York City (and not very far from my native Brooklyn) before entering the USAF, there I was returning from a trip that took us out over the Pacific Ocean and up and down the Pacific coast, working the key for a good part of the time. Morse code was fast becoming my second language.

The sheer size of the RB-36(162 feet long, 230 feet of wing span) instilled a great deal of confidence in any newcomer who may have thought of airsickness. I was soon to learn that this behemoth could bounce around the sky as much as any puddle jumper. Sending position and weather reports while bouncing around in a turbulent sky was something I didn't expect, but soon learned to live with. It was a lot like trying to send Morse while being strapped to a bucking bronco.

As the new kid on the block, I was put under the protective wing of Master Sargeant Leslie "Jimmy" Doolittle, an old-timer who knew his radios inside and out. Under his expert guidance, the transition from schoolboy Radio telegraghy to the real world went smoothely, and within the year I would be reassigned as "First Radio" on a new crew. While "Jimmy" wasn't related to the famous General, the nick-name came naturally, and he accepted it gracefully. He was a gentleman, and treated me as a son, teaching and guiding me through the vast array of radios and antennae that were mounted on the RB-36. He was willing to share his experience and knowledge which was a great help to a wide-eyed 20 year old who felt a bit inadequate in the job.

The radio compartment of the RB-36 was very spacious when compared with the larger military aircraft of WWII. We even had a bunk to rest in when it wasn't occupied by an off duty crewman. There were many attempts by the aircraft designer to make the ship comfortable, but comfort was not a prerequisite in military aircraft. No matter how they tried, it never was warm enough, and we ran out of room fast when it came to stowing A-3 flight bags containing extra clothing and other odds and ends usually needed on those long flights. With 22 men aboard as regular crewmen, we soon found space at a premium.

Aside from the usual radio traffic, the radio operator was responsible for the active phase of Electronic Warfare, which meant worrying over jamming transmitters which were supposed to blot out ground radar scopes, and confuse those who might want to send fighter aircraft to intercept our flight path. With the help of the Electronics Counter Measures (ECM) team in the tail of the ship, we became fairly proficient at radar jamming, but we were happy that this technique would not have to be tested on the real thing.

During the early 1950's Strategic Air Command bomber crews were constantly training and sharpening skills which would be needed should this country suddenly find itself at war again. There seemed to be constant motion, or eternal waiting heightening anxieties about the Korean War which was then in progress. There were classes most days, and required athletic activity to stay in shape, whether the individual was so inclined or not.

Crews stayed together most of the time while on duty and their whereabouts known at all times when off duty. When a mission was scheduled, the Radio Operator spent the day before in preflight inventory and testing, ordering special equipment needed for the flight and preparing for the mission briefing. Four hours before the mission (sometimes at 3:00 or 4:00 am) the entire crew ran its preflight tests and inspections again, to catch any last minute failures which might endanger the success of the mission. The radio equipment ranged from the BC-348 receiver, Collins T-47 transmitter for the HF telegraphy, to the ARC-3 and ARC-8 VHF and UHF transceivers used by the Pilot for tactical and air traffic control communications. There was also an array of radio receivers covering the entire spectrum for use in Electronic Reconnaisance, and an IFF (Identification, Friend or Foe) transponder which would automatically identify us as a Friend to our ground radars. Other equipment that was the responsibility of the Radio Operator included an Omni range receiver and Electronic Countermeasures (ECM) antennae. Everything had to be in working order, or the flight would be held up until replacements could be installed.

*This RB-36E of the 72nd Strategic Reconnaissance Squadron, **5th Strategic Reconnaissance Wing**, started life as a B-36A, minus jet pods and exotic recon gear.*

Majestic formation is held by a trio of 5th Wing RB-36Ds. Plane closest to camera (serial number 49-2695) later became a GRB-36D FICON carrier at Fairchild AFB.

There were many experiences, some enlightening, some puzzling. During an Operational Readiness Test (ORT), every ship that could fly was sent on a long mission to Alaska and return. QRN and QRM made it impossible to communicate on the assigned frequencies, and most of the ships were unable to get their radio traffic out. On this particular trip, I was working as Second Radio for "Jimmy" Doolittle. After a couple of hours of frustration, he came up with a novel solution to the communications problem. One of the military frequencies was on a lower band which was beyond the T-47's capability. After listening and finding the channel clear, "Jimmy" showed his genius. On board the ship, we had an aerial photography section. The film for their cameras came in varying sizes of aluminum cans. Fitting two cans together, one inside the other, and insulating them from each other with cardboard from a food carton. With some wire from his kit, the cans were connected to the transmitter to serve as a tuning capacitor, enabling us to get into that quiet frequency. We were one of the very few ships on that mission to successfully fulfill our radio traffic requirements. Needless to say, "Jimmy" Doolittle became the wonder of the 5th Strategic Reconnaisance Wing.

On many occassions, our training missions would find us flying over California's San Joaquin Valley, and be completely cut off from local military radio stations. It was mysterious to many of us why, when flying over central California, we found ourselves unable to communicate with such California Stations as Castle AFB near Merced, Travis AFB, near Fairfield (our home base), or March AFB, near Riverside. Oddly enough we had no trouble sending our traffic, via the skip phenomena, through Kadena, Japan, or Fairbanks, Alaska. These stations came in loud and clear, but sending traffic through these stations meant delays in forwarding, and we very often returned to base at the completion of the mission many hours before our traffic arrived at that same destination.

Weather observations were a large part of our radio traffic, and Staff Sargeant George Neary from Hermiston, Oregon, was our expert observer who also served as the nose gunner. He was a close friend who expended a great deal of time and effort in making a match-up that is still going strong, after 24 years. He introduced me to my wife.

One of the most interesting experiences of my career came about by chance. Another crew was scheduled to fly a mission, but their radio man was in Texas, at the Strategic Air Command's Flight Crew Evaluation Center. Somehow, I was assigned to fill in for him, and had the pleasure of assisting in an altitude record for dropsonde release. A dropsonde is an instrument that was released from an aircraft. As it descended, attached to a papachute, its little transmitter sent out in Morse, the pressure, temperature and relative humidity until it fell into the ocean. It all seemed very routine at the time. The instrument package was dropped by the weather observer, Sgt. LeFrancois, from the aft hatch, after zeroing my radio onto the dropsonde's transmitter signal. With both of us copying the transmission, we managed to get all the data it had to send. It wasn't until we returned to base, and the data analyzed, that we learned we had set an altitude record of 41,627 feet for release of dropsonde units. That was in 1952, and I had just turned 21.

The B-36 was on the drawing boards at Consolidated Aircraft (later known as CONVAIR) in 1941, but it wasn't until the 1950's, when it came of age, that it really earned its' name, "Peacemaker". There wasn't any place on Earth that could not be reached by this behemoth, and many of us proudly wore CONVAIR's "1000 Hour" pin, awarded to all B-36 crewmen who accumulated that many hours of flight time in the "Peacemaker". With an average of 25 hours per flight, it didn't take long to reach that magic number.

The B-36 had an active life of about 13 years, and in that time many men spent thousands of hours learning to use it to guarantee a semblance of peace in that period between the Korean and Viet-Nam wars. The Radio Operator, with his dual role of Communicator and Electronic Warrior, played a major role in that effort.

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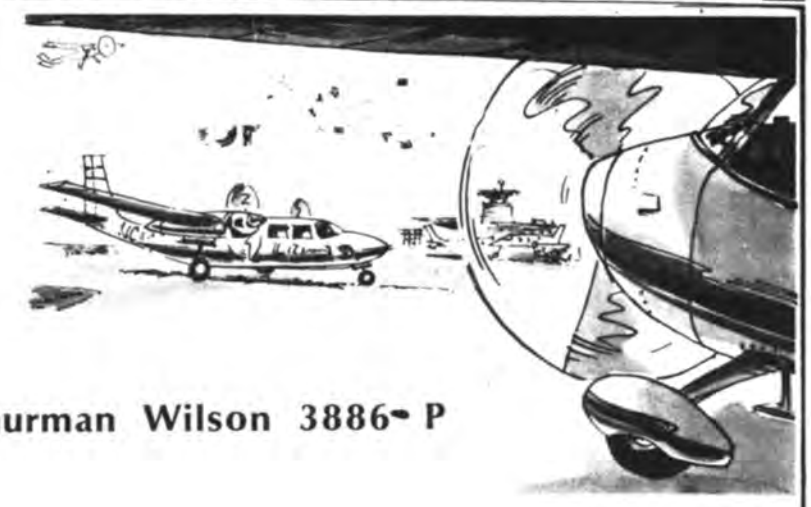
Source materials: "Thundering Peacemaker"
By Frederick A. Johnson. Personal files, J. Di Mento.

Winter snows carpet the ramp at Fairchild as crews ready a GRB-36D. Open bay doors are barely visible, with curved contours for receiving a special RF-84K Thunderflash reconnaissance jet. Large three-digit numbers are used on forward fuselage, along with large U.S. Air Force lettering. Fuselage is silver overall, without white anti-radiation paint on undersides, used on nuclear bomber versions to deflect heat from an atomic blast. SAC band on nose extends to lower fuselage.

EASTERN AIR LINES

AIR LINE RADIO OPERATING IN THE 1930'S



By Thurman Wilson 3886-P

Air line radio communication systems in the 1930's were not exactly in their infancy, but compared to what we have today - well, there just isn't any comparison.

I accepted a position with Eastern Air Lines (EAL) as a radio operator trainee in November of 1936. Prior to this I had been radio operating on ships in the United Fruit Company's Great White Fleet.

The air lines about this time were expanding their communications systems and hiring a lot of sea-going radio operators, some of whom were my old buddies at the Gulf Radio School in New Orleans. Others had also been in the United Fruit Company. Forest Roberts became an East. Air Line radio operator shortly after graduating from Gulf Radio School in 1930. He was one of Eastern's first chief radio operators, and was stationed in Miami, Florida (WEEM) for many years. Carl Merrick, another Gulf graduate was chief at Jacksonville, Florida (WEEJ) for a long time. Then Paul Fruge, a radio school pal, and fellow employee with United Fruit Company joined EAL in New Orleans about 1935. He remained with them until retiring a few years ago. Then last but certainly not least, another old radio school graduate and United Fruit Company pal, Marion Aime joined EAL shortly after I did. He started in Miami as most of us did for our air line communication training, then transferred to Jacksonville, finally making it back home to New Orleans (WOEN). At one time Aime, Fruge, and I were all stationed at WOEN.

In those days after a radio operator's application had been accepted by the Eastern Air Lines radio circuit supervisor, Mr. N. B. Ellis, the applicant was notified to appear at the nearest EAL cw station for a code test. The Miami chief radio operator, Forest Roberts, usually transmitted the test from WEEM in Miami. It was sent at about thirty words per minute. The test contained all kinds of air line abbrevations, puncuation, etc., and usually lasted about three minutes. Immediately after the test message was transmitted, the applicant had to repeat the entire message. This was a good test as it not only revealed how well one received code, but also what kind of a fist the applicant had. Forest usually let us poor devils sweat a few minutes before advising that air line tickets (free passes) would be given to us to fly to Miami for training and later transfer to what ever station had been assigned to the applicant.

The Eastern Air Lines headquarters radio station in Miami was also their training school. The school had about five dual radio operating positions where new operators sat alongside the old professionals who were handling real voice and cw communications. We endeavored to copy what the pro was copying. Believe me, it was not easy! Those of us from the United Fruit Company's Tropical Radio Telegraph communication system thought we were about tops in copying code. After all, we had been copying daily, several pages of radio press and market reports for the ship's newspaper. After the first day of trying to equal or excel our teacher's handling cw and voice communications we were about ready to give up and pack for home. The old pro's seemed to be absolute geniuses. They monitored about three cw channels on head phones and a couple of voice channels on speakers. They operated the mike with a foot pedal, sent code with one hand and endorsed messages at the same time with their other hand. The only appendage free was one foot, and it was badly needed for keeping time with our sending rhythm or swing.

There was no VHF or UHF. It was all amplitude modulation (AM) and cw on frequencies from around 2200 kcs to 11,980 kcs. 4122.5 kcs was the plane to ground channel. It was montored very carefully. No matter what the ground station operator was doing, whether it was handling cw traffic, voice traffic with non-cw stations, or on the telephone, the cw operator would stop everything to answer the aircraft.

They tell the story about one operator who apparently had not learned his communications priorities. He was on watch during a midnight shift in Jacksonville and very busy with cw traffic when flight 10's captain called in advising he was having trouble with one of his two engines. Much to the captain's surprise and amazement the operator responded with "Please stand by flight 10, I am very busy with cw traffic." No he was not fired - probably because the engine trouble cleared up, and the captain was a very understanding person.

AIRLINE RADIO OPERATING IN THE 1930'S

BY - THURMAN WILSON - 3886-P

In that Era one of the most important communications in EAL was called a "Plane Dispatch." This message gave the flight and plane numbers, name of captain, copilot, time of departures, estimated time of arrival, next stop, amount of fuel aboard, number of passengers and their destination, and possibly other information that I have forgotten.

One of EAL's routes at the time (about 1940) was from Newark, NJ Airport to Brownsville, Texas via Washington, D.C., Atlanta, GA., New Orleans, La., Houston and Brownsville, Texas with intermediate stops between the major airports just mentioned, such as Mobile, Ala., between New Orleans and Atlanta.

Immediately upon take off of an aircraft on the above route, the Newark radio operator would open up on cw calling all the cw stations on the route, indicating he had a plane dispatch (PD) to transmit. Washington (the next stop) would indicate he was ready to copy by sending his call letter "WEEK" one time. Atlanta would follow with "WEEA" then New Orleans with "WOEN", then Houston "KHOU" and last would be the end of the line Brownsville with "KBRN". WEEP would then send his call indicating message was received. If during the transmission of this message one of the receiving operators had to stop copying and answer a plane, telephone, etc., he would ask for repeats after all other stations had receipted for the plane dispatch. The cw station operators would then relay the plane dispatch by voice radio to their nearby intermediate stations.

As soon as this flight landed and took off from Washington, another plane dispatch would be initiated by Washington and sent on down the line. This procedure continued until the flight terminated in Brownsville, In this last instance, Brownsville would send an abbreviated dispatch indicating the flight had landed in Brownsville, and the time of landing. This message was transmitted back to all stations where the flight had landed during its' trip.

EAL employees, from Captain Eddie Rickenbacker, our boss and our hero, on down to the lowest ranked baggage handlers were a part of a very closely knit organization. Managers, pilots, mechanics, ticket agents, radio operators, secretaries and other support personnel were one big family. One example - Captain Rickenbacker gave us a certain number of flight passes a year. With these passes we could travel free to any city EAL served. The only drawback was that we could be bumped off the flight in any city, if our flight had been sold out prior to take off. When this happened we never had to worry about going to a hotel. One of the employees at that station would always take you to his home and keep you until a seat became available on a flight going to your destination.

During the 1930's domestic air line radio operators handled all communications with their company aircrafts. This included landing and take off instructions, flight plans, weather, etc. The plane's altimeter was a sensitive aneroid barometer used to measure altitudes. It was graduated and calibrated for finding distance above sea level, terrain, or some other reference point, by means of air pressure. All of the base stations were also equipped with this instrument as well as an anemometer (wind force and direction indicator). When an incoming flight was about 20 miles out, the captain would radio that he was 20 miles out and would request landing instructions. The radio operator would reply "20 miles out ok, altimeter reading 2990, winds north at 10 miles per hour." The pilot would then reset his altimeter to match that of the base station and would be able to determine exactly at what altitude he was flying.

All radio telegraph operators have heard such terms as "banana boat swing," Cuban swing and many other kinds of swings. The banana boat swing of course had to do with the way that particular company's operators formed their dots, dashes, and spaces in transmitting international morse code. In other words it had to do with the symmetry or in this case, the lack of it in sending code. It seemed to develop when a group of operators exchanged a great deal of radio traffic with each other, as did the United Fruit Company radio operators. Some said this company's banana boat swing came from so much sending of the call letters "KUFC" which was the call used to get the attention of any or all United Fruit Company vessels. KUFC is a very musical swinging sound when put into code. The Latin swing came from the way most Cuban and Mexican operators ran their words together. There were many other swings. In early 1936 EAL radio circuit supervisor, Mr. N. B. Ellis decided to develop an EAL swing for his radio operators. It was not going to be easy, because operators now in EAL had not worked as a group for very long, and most had retained sending characteristics developed in various companies they had worked for before joining EAL. Mr. Ellis finally dreamed up the idea of redesigning our semiautomatic telegraph keys (bugs) to give us an EAL swing. The idea was to drill a hole one half inch in front of the stationary dot contact post, and reset the post in this hole. Then move the vibrating contact up to make contact with newly positioned stationary dot contact. Most of the EAL operators gave it a try, and we truly did come up with a swing like no one had ever heard before! After a good try for a few weeks, we all moved our bug's dot contacts back to their original positions. Poor Mr. Ellis didn't realize his dream of an EAL swing, and most of us never sounded the same afterwards.

One of my proud moments with EAL came shortly after being transferred to New Orleans from Jacksonville, Florida in November 1936. At that time we had two pypes of passenger planes, the Lockheed Electra seating about 8 passengers, and Douglas DC-2's seating a few more. On days when a flight's estimated passenger bookings indicated we would have more passengers than the Lockheed Electra could seat, our station manager would send a message to Atlanta requesting a DC-2 for that day's flight. One night I was on the midnight watch all by myself, and while checking bookings and radio messages handled the previous day, I noticed a Lockheed Electra was scheduled to make the next day's flight from New Orleans to Atlanta. It was also noticed that bookings for that day had more passengers than the Lockheed could seat. I quickly sent a message to Atlanta notifying them of the error. They immediately flew a DC-2 down to take care of the over-booked flight. One point they kept stressing was the "Alertness of the radio operator on duty." I took some kidding from the other operators, Charlie Daniels Paul Fruge, and Dennis Fontaine about it. They knew just how "unalert" a guy can be while he is trying to keep awake on the godforsaken midwatch.

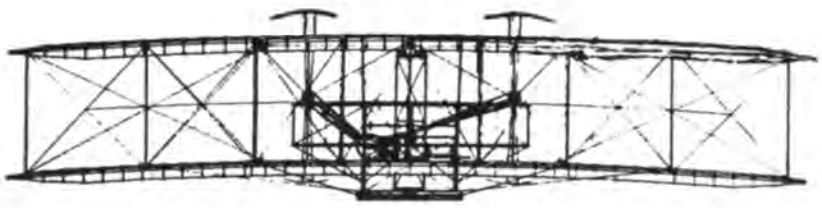
I have had to depend completely upon my memory for these stories that happened almost 47 years ago. So please, you old time air line operators, be a little easy on this old geezer's attempt to relive a little history, way back when.

DIAMOND JUBILEE OF POWERED FLIGHT

Wilbur and Orville Wright

December 17, 1903

Orville wires his father: "Success four flights Thursday morning all againt twenty-one mile wind started from level with engine power alone average speed through air thirty-one miles longest 57 seconds inform press home Christmas." (This is how the telegram was sent — without punctuation). The airplane was wrecked by a sudden gust of wind shortly after the fourth trial.



FACTS ON THE BIRTH OF AVIATION
80 YEARS AGO --- ON DECEMBER 17 1983

FOUR SUCCESSFUL FLIGHTS:

+ FIRST TRIAL - Orville at the controls.
  TIME IN THE AIR - 12 Seconds.
  DISTANCE COVERED - 120 Feet

+ SECOND TRIAL - Wilbur at the controls
  TIME IN THE AIR - 12 seconds
  DISTANCE COVERED - 175 feet.

+ THIRD TRIAL - Orville at the controls
  TIME IN THE AIR - 15 Seconds
  DISTANCE COVERED - 200 Feet

+ FOURTH TRIAL - Wilbur at the controls
  TIME IN THE AIR 59 seconds
  DISTANCE COVERED - 852 feet.

DETAILS OF THE FIRST AIRPLANE:

Wing Span - 40' 4". Length overall - 21 feet
Height - 8 feet; Wing area - 510 Square Feet
Maximum takeoff weight - 750 pounds. Empty weight 605 pounds. Engine 42 horsepower.

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EARLY HISTORY & EXPERIENCES

By Lee Machen 2376-P

Aviation Radio has "come a long way" as the saying goes. The bugbear of commercial and military aviation, load factor,has been considerably lessened by communications equipment advances (miniaturization, crystal-control, solid state, switching, etc.) and crew reduction (gradual elimination of the flight radio operator in many cases. On the ground early considerations were economical as beginnings were during the depression era. This paper dates back to experiences/memory of 1931 up through early 1941 when much changed due to inevitability of WWII with its considerations of security in communications.

Aviation radio ground facilities called for acreage remote from the airport served in the beginning where transmitters/receivers were in one location but as time/development set in control of equipment centered in the operations area of the airport with remote telephone lines. In many cases the old radio shacks were used for the remote equipment several miles from the airport.

The following is an example of aviation radio as it began and developed within Eastern Air Lines (originally Pitcairn Aircraft then Eastern Air Transport - EAT as of 1931.

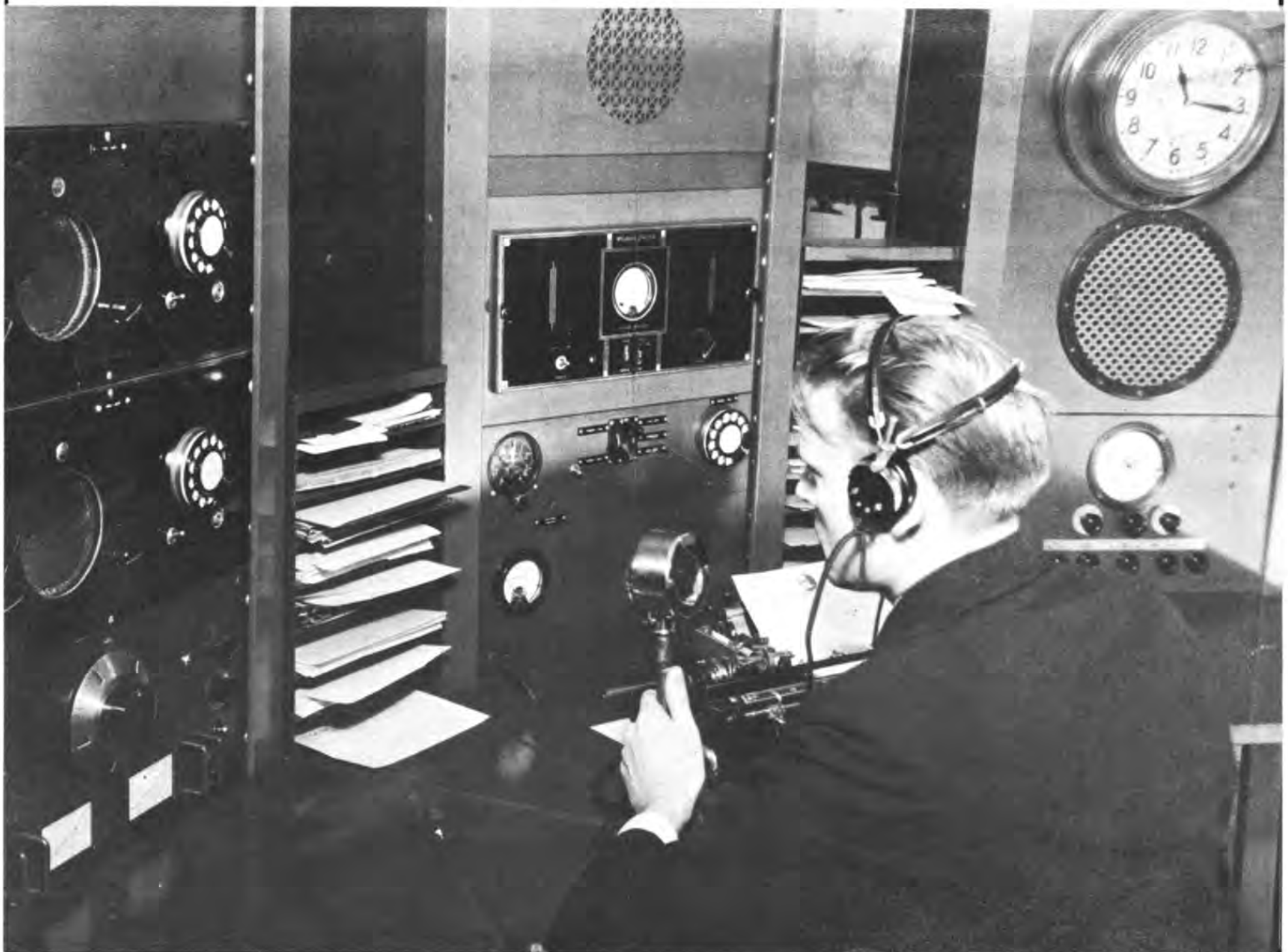
U.S. Navy aviation radio requirements were as the Army's; the former for such missions as reconnaisance, gunnery spotting, training (constantly expanding with the inception of aircraft carriers) while the Army had similar purposes. The results of WWI combat were being taken into account in any case. My earliest recollection of military aviation being at Fort Myers, Virginia, and Annapolis, Maryland.

Commercial aviation radio. Using the pattern of development from 1931 until early 1941 and the company first Eastern Air Transport (part of Sperry Gyro then General Motors) then separate corporation formed by Captain Eddie Rickenbacker.)

Equipment - In the air - Curtiss Condor, Curtiss Kingbird, Ford Tri-Motor. As time went by DC-1,2,3,4, Lockheed Electra Constellation, etc. Radio equipment was RCA in the early days followed by Western Electric, Bendix - not necessarily in that order. SOWP members M. R. (Mickey) Cochrane is a better authority on this as is Howard Mehrling.

On the ground remote radio shacks some miles from the airport housing RCA transmitter and receiver with emergency power furnished by Kohler plants. Buildings designed for live-in whenever necessary. Communication with field operations by telephone and, later, Mod. 14 teletype. (See Gran'ma Moses sketch attached.) Additional items were gradually added such as Kollsman altimeters to give landing pilots zero altitude on the runway. (let's not forget the "head" and sanitary system!) Certain radio stations changed operational status as the airline developed and communications plans were revised. In 1931 Richmond (WEER) and Atlanta (WEEA) were THE spots where operations and flight personnel were concentrated but this shifted to Newark, Washington, Atlanta and Miami. Whereas Richmond became less of an operational spot it increased in communications value due to its mission as relay station to/from stations south onto the longline teletype installed at stations from Richmond north (Richmond/WEER, Washington/WEEK, Baltimore/WEEB, Camden Newark/WEEN/WEEP. A lineup of stations is here listed: WEEA Atlanta a key station for pilots, mechanics, aircraft, service to stations as far south as Brownsville, Texas, San Antonio, Memphis, etc. Located two miles from the original airport Candler Field (Originally a private racetrack for the Coca Cola family)- In 1931 was similar to other stations in place; one transmitter (RCA) and receiver (RCA) but gradually expanded through the 30s to a multi-frequency coverage. Air routes gradually increased coming from all directions - from the south, west, north and east. The remote building

FEBRUARY 1936 - LEE MACHEN AT CONSOLDE NEW W.E. XMTR _ STATION WEEK - WASHINGTON HOOVER AIRPORT. NOTE ALTIMITER. (Continued Next Page)



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became a remote receiver site and all equipment/ operation moved to the airport operations area. Traffic load increased as stations to the west added, mail-only (Mailwing aircraft - one pilot, no passengers) from the east (Jacksonville), and flights extended south to Texas. Expansion included additional operator coverage; more than one operator on watch at a time as opposed to the early single man with split phones guarded C.W. and aircraft frequencies. Some of the operators of this 1931-41 period (Hope any I miss will excuse please.) were: L. A. Watson, Bill Keating, Phil Partee, Bill Whytock, J. A. Gassaway, W. D. Rollick, L. Spicer.

WEEB Baltimore - Building and operator remote from the airport; same setup, initially, as others 1 transmitter, 1 receiver, Kohler power plant, live-in space (When and if found necessary). Original operators went to other fields and can't recall names exactly. When building was closed down radio shifted to the airport and operated by holders of Third Class radiophone licenses. This field, Logan, was later closed down and a large one, serving Baltimore-Washington built.

WEEC Charleston, S.C. Same setup of remote building - c.w. and aircraft coverage etc. All shifted to airport operated by 3rd Class licensees. Some operators, Linwood Sikes (Chief - SOWP member), F. Ogilvie (Went with CAA/FAA as an inspector), D. W. Poole (Deceased).

WEEF Spartanburg, S.C. - Initially same as others with eventual shift to 3rd Class ticketholders at airport operations. Some operators - Louie Curen (Who came down from WEEN Newark), John Buddi (Later WEEM Miami chief).

WEEG Greensboro, N.C. - Same as others in early stages etc. Frank Jenkins held down the chief's job until the eventual shifts made (as I remember) then to WEEM Miami and later with PAA as navigator. Understand on the West Coast doing same sort of work individually.

WEEH Mc Rae, Georgia - Same as others. N. B. Ellis chief during its brief existence. Half way between Atlanta and Jacksonville.

WEEJ Jacksonville, Florida - Same story here. Also a busy station with flights in from Miami, Atlanta and the north. Chiefs Frank Melville and C. L. Merrick; Carl retired from Eastern Air Lines and living in Jacksonville. Frank deceased, made quite a pile during WWLI running a radio school for the Services.

WEEK Washington, D.C. - Operating position at the airport from its inception at the old Washington-Hoover Airport; single operator with a female teletype operator added later. Equipment augmented when shift to the new airport made (Washington-International). Like other stations c.w. and radiophone operations prevailed particularly busy between Newark/New York (WEEN/WEEP) and Washington where passenger traffic and aircraft movements were heavy. Some of the operators were John Buddi (Chief), Howard Shade (Whose heavy bass voice matched that of Bill Whytock (Atlanta WEEA) and the late Arthur Godfrey), Dick Frazier (Who later became chief of air traffic controllers Washington for Doc/CAA FAA. Dick passed away several years ago.), Charlie Cunningham (Chief Following Buddi - an old merchant marine hand), George Clark (Became overseas inspector

for CAA/FAA during WWII), Hedrick (From USCG - to ATC was at the old Washington-Hoover airport with a limited number of personnel who "practiced" in conjunction with the airline "company" systems of operational control). Unusual features of the Washington-Hoover airport called for alertness in keeping incoming pilots advised of; the Good Year blimp that operated from the field in and around the Washington metropolitan area; and the towers of old NSS atop the Virginia ridge which gave a good estimate of ceiling height under various condidions (If cloud clear of it the ceiling was 800 feet plus). In giving landing instructions two or three wind (surface) directions were involved due to this ridge to the south and the plains north of the Potomac river. The airline radio operator had a clear view of NSS and acted accordingly.

WEEM Miami - The airport area owned by PAA and used for their pilot training prior to the heavy traffic influx; 36th street. The EAT radio station and operator located some four miles away on 79th street. At that time there was considerable talk about whether airlines would use the 36th street strip or the Municipal airport so this station location was a compromise for the time being. The building was still being used when I last saw it around 1947; first as an experimental station for the meteorological people and finally a residence. As I recall the experiment went in for DF direction-finding of static fields for movement and intensity.

Forrest Roberts was the first chief then branched into pilot training. At one period he operated a frequency standard with the then existing station lining up after operational hours (This was practical because there were times when no heavy aircraft schedules operating.) The radio shack was eventually abandoned and operations moved to the passenger terminal building at the airport. The number of operators and operating positions increased and facilities expanded. Eventually ARINC (Aeronautical Radio Inc.) and FAA facilities eliminated the company guard of scheduled aircraft.

During WWII a large number of EAL operators flew with the MTD (Military Transport Division of the Air Corps) under contract with EAL and with EAL pilots. Flights were to South America and Africa. Believe the aircraft was C-46.

Miami became the main headquarters of EAL so the administrative/operational loads increased to a point where this station and others later used teletype, telephone and computer setups. In this regard Ray McAvoy was the driving force in this expansion. He is now retired and living in Georgia. An outstanding radio-telegrapher and traffic mover. Some of the operators; Forrest Roberts opened the station 1931; followed John Buddi, W. T. Bill Alexander, O. N. Baumgart (Who insisted on holding down the midwatch.), W. W. Lindner (Was marine operator WAX just before dying in that area. Although crippled at the time he flew his own private plane in the Ft. Lauderdale area.) L. L. Louie Lykins, R. J. Miller (Came down from Atlanta WEEA) (Flew as flight operator on one of Dick Merrill/Arthur Godfrey flights to South America), L. F. Rogers, L. F. Spicer (From Atlanta; left EAL to ARINC Miami. Deceased.) (W. N. Thomas came to Miami as an able assistant to R. A. McAvoy in developing the landline operations.), W. K. Bussey, C.L. Walkden, Brad Crowell (From Newark WEEN: deceased)

(Continued on Page 18)

(Continued from Page 17)

EAL - MACHEN

WEEN Newark, N.J. - Original station located near the oil fields close by Rahway, N.J. - Oil companies had a c.w. ptp station down the road to Bolivia while across the creek (Caarteret) was broadcast station WOR. Same physical setup as the other, original stations. First Chief was Brandon who went with American Airlines and I relieved him. Louie Curen soon joined me but was subsequently sent as chief in Spartanburg, S.C. Carteret/Rahway about 10 miles from Newark airport. This station had a slow start as a teletype circuit existed between Newark airport and Richmond airport over which much "home office" traffic passed. (Call WEEP when operations moved to Airport) As aircraft activity increased communications center was moved to Newark airport and the old radio shack used to house remote receivers; tied to control equipment at the Newark operating position/s. A Western Electric transmitter was installed and this was the subject of much visitation from technical people in the area (Including Dr. Mendenhall and his Bell Labs associates. One team of Japanese engineers showed up one day and photographed every component in real oriental style. Don't know what happened to the Guest Book which contained some interesting people.) Additional equipment followed(Wilcox high-power units for working with Miami and Atlanta on 11960kc for example. Several additional operating positions added all installed in an air-conditioned room. Company dispatchers were in the adjoining office for quick deliveries. Each position had a suspended mike with two foot-pedals - one for on-the-air and the other into the dispatchers area.

General Motors had taken over EAT and changed the name to EAL Eastern Air Lines with headquarters in New York City so traffic (cw) was brisk to the other key points-Atlanta (Meteorologist and dispatchers for the southern segment of flights) and Miami (which was becoming increasingly important as an eventual home office and top operational/maintenance people). The first overseas operation was to San Juan; soon the Bahamas became involved and ARINC (Aeronautical Radio) came into the communications picture. Eventually, like other places, teletype and plt (private telephone lines) came into play gradually phasing out the manual c.w. handling. Captain Rickenbacker launched an independent company setup with employees of that time (Middle 30s) having stock purchase plans etc. Expansions westward (Chicago, Memphis etc.), south (New Orleans, San Antonio, Brownsville etc.) Some of the operators assigned commencing the first - Brandon (Who moved over to American Airlines; his hometown Nashville), Niskanen. L. A. Watson (Later moved to Atlanta as chief and, eventually, became Communications Manager Piedmont Airlines), M. J. MacDonald (Later moved to Miami and was a flight operator, during WWII, with Military -Transport Division of Air Corps), Fred Becker (Formerly of N.Y. Times WHD), Howard Burns (Later in charge FAA radar section JFK Airport), Frank Melville (Later chief of WEEP then to private business heading a radio school during WWII), L. C. Curen (1931 then to Spartanburg then with an airplane flying out of Mobile for S.A.), W. B. Crowll (Later to Miami; deceased.), B. O. Hilts (later chief WEEP and headed up computer complex working with R.A.M. MacAvoy, Augie Nickel (Deceased), Larry Felton (Now living in Florida) and some others I can't immediately recall.

WEER Richmond VA. - Same standard building, equipment as others of original setup; about 2 miles from Byrd Airport. 1931 was headquarters for Operations Mgr. Northern Division and this function gradually moved northward to Washington, Newark and LaGuardia. One operator station until late 1931 when a second one added; original chief Bert Denicke - I was second and eventually chief as Denicke left for a FAA post in Washington. He was flight operator for Lindbergh on his South American flight for PAA. (Mapping & Survey). A teletype line linking Richmond, Washington, Baltimore Camden and Newark / New York City existed at this time and much administrative/reservations traffic handled on it while radio was increasingly used by executive branch in Brooklyn and New York City. The teletype lines reached further south but was cut south of Richmond and this station became a traffic gathering/relay station for traffic coming off the teletype line and sometimes the radio link north. This load gradually eased with installation of high-power, 11960kc for example of frequency used, between Atlanta, Miami and Newark/NY. As traffic increased on the Washington-Newark run it was necessary to also use radiophone additionally between those two places since Reservations control had been moved from Richmond to New York. Prior to that time the same condition existed between Richmond and All stations (Prior to expansion of operations.).

The Richmond operators (one to a watch) picked off teletype traffic and relayed south and at the same time reversed the order of traffic headed north from the stations south of the teletype terminus. This called for some speed in sending/receiving and it was fortunate that well qualified vibroplex operators were assigned.

Northern headquarters were eventually moved to Newark and additional equipment/personnel added at this place to handle traffic on 11960kc to Atlanta and Miami.

The Richmond WEER building was eventually eliminated and air/ground communications handled by operations personnel holding 3rd Class Certificates FCC.

Orlando WEEO was the same 1931 type installation/operation and eventually phased out to operations personnel at the airport.

General Call to all stations EAT/WEAT, EAL/WEAL.

This covers most of the early developments/operations. Eastern Air Lines has branched out all over the place and follows the air-ground radiophone QSOs with FAA and airport facilities.

Frequencies used (Some juggling around under unusual atmospheric/skip conditions as necessary):

Day c.w.
8130kc 11960kc 6600kc
Night c.w.
2986kc
Day radiophone
4122.5kc (Optimum usage of this frequency.)
6590kc (Mostly longhaul.)
Night radiophone
2922.5kc

Usually maintained sustained speed C.W. 30wpm on the "express" frequencies; 11960 8130.
Operators used Vibroplex, Mac Key Sideswipers - straight key when necessary.

DOC - Department of Commerce radiorange and point to point stations manned mostly by ex-Service men who maintained the radio ranges and handled traffic interstation (Using their own brand of Philips code and characters). Voice on range frequency; c.w. on ptp. An example in personnel was Westerlund chief of the Richmond DOC (Later Civil Aeronautics Authority and finally FAA) whose two sons went on to become U.S. Naval aviators stepping up from flight radio operators. There was a goodly sprinkling of ex merchant marine operators also. Airline pilots were being checked out on instrument flying in the early 30s; among other things making airport approaches using the "cone of silence" that existed over the DOC antenna array.

ATC Airways Traffic Control gradually developed involving landline, PLTs and radar. As already mentioned airline radio operators were recruited whenever possible due to their experience in air-ground communications and flight control. In the early days at least.

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"YOU ATE THE RADIO — SEND THEM A CALL LETTER."

(Continued from Page 18)

EAL - MACHEN

POTPOURRI

FCC LICENSES - There were many First and Second class licenses prevalent in the airline. In the middle 30s they came out with a requirement for an Aeronautical* endorsement and I received mine from Foley (Norfolk FCC) around 1932. Radiophone endorsement in 1937. *This requirement seemed to fade somewhere along the line. The endorsement read "The holder of this license has qualified by examination to act as operator at any aeronautical station. Signed W. R. Foley, Norfolk, VA., May 9, 1932. One of the examination items was a working knowledge of the aeronautical Q signals which began with QA__ QAO Request for winds aloft - etc.

Radio operator "sines." - Some might recognize their's from the following used along the EAT/EAL routes 1931-40 -
BA BC BD BM BR CD CL CM CW DJ DL DN DW ED EK FB FC FJ FL FN FO GT GE GC GY HL HN HL HM HS JB JF JW LA LB LC LM LN LR LS LW LY MC MJ ML MR NA NS OZ PA PJ RD RJ RL RM RV S SC SL SX TJ WE WL WN XL XS (May have missed one or so.)

Operator "fists" - We were blessed with a high percentage of excellent operators using Vibroplex, sideswiper-MacKey and straight keys. Removing the end weight was taboo in the interests of accuracy. On the other hand some used do-it-yourself weights that limited the use to the owner. SCUSE PLEASE! Forgot to mention the MacKey which was also used. Howard McElroy would have my scalp if I didn't include this popular keyer. Fists were identifiable; particularly at change of watches. And, of course, there was the operator who always plugged in his key, in the closed position, announcing his arrival.

AIRLINE PILOT radio operators - A few became quite good aloft in the early days when transmitter range could be extended by using c.w. when phone just wouldn't reach. Ground radio operators did some informal schooling of pilots who were being urged to use C.W. One pilot became an avid ham - Champ Taliaferro - who was, for a time, the youngest airmail pilot in the U.S. He had an elaborate setup in his home near Wilmington, Delaware. His mother was a DuPont and one of his uncles, Henry, used to drop by, at Newark, and chew the fat about aviation radio in his private plane.

SPECIAL QSOs - Bothe Dick Merrill trans-Atlantic flights were covered by EAL stations using 6590kc; first was the famous ping-pong ball in the wing affair with the then popular nightclub performer Harry Richmond. The second was with co-pilot Jack Lambie to pick up pictures of the British Coronations ceremonies in 1937.

Several contacts with the China Clipper were made from Richmond, early morning, when it was somewhere between Hawaii and the Philippines.; 2986kcs c.w.

The Cleveland air races provided some communications with EAL planes participating at that time. Some other racing aircraft, trying for records, also used EAT/EAL facilities, radiophone in these cases.

MTD Military Transportation Division (of the Air Corps). Quite a few EAL operators served as flight operators in this special activity involving EAL

pilots and radio operators during WWII. Flights were from Miami to South America and Africa; carrying vital supplies at the time. Believe the aircraft used were C-46's.

Other Airlines - Domestically, American Airlines used c.w. between stations to a great extent. PAA did of course and Pete Fernandez could clue us in on that. I knew several operators and Jarboe who was originally from my hometown. Last saw him when PAA was flying out of Baltimore to Bermuda.

NYRBA (New York - Rio-Buenos Aires) had a short life and, as I remember, used radio in similar fashion to PAA. I saw their passenger float-terminal in Havana harbor around 1929 to the best of my memory.

ANTI-STATIC devices on aircraft wings was being experimenting with by the Navy in 1941; build-up of static was quite a problem in the early days.

TRAFFIC (MESSAGE) TOTALS were, at one time in EAT/EAL, included in cost-accounting procedures; so much a word etc. It helped to point up the important part of radio traffic handling in the picture. Volume continued to increase and the practice discontinued; it had made its point. It must be remembered that traffic included weather, flight clearances, executive directives of immediate importance, reservations, dispatches (listing flight designation/times in/out/delay cause, break-down of cargo including passengers, extent of clearance, "next stop" and itinerary etc.

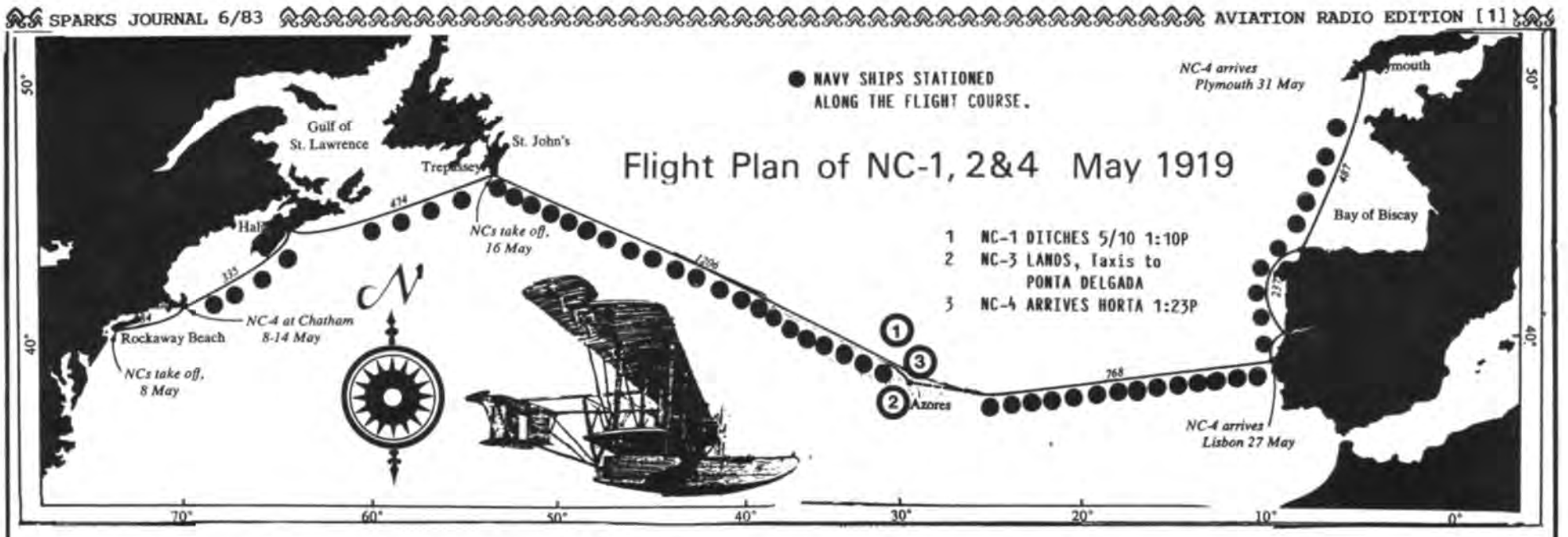
AIRMAIL SERVICE FROM CAMDEN N.J. AIRPORT TO ROOF OF PHILA. POST OFFICE Around 1937-38 EAL operated an autogyro from Camden Airport to the roof of the Philadelphia Post Office. Radio contacts were negligible. The pilot was, as I remember, called up, early, to active duty with the Navy. Dave Little was RCA representative at their aeronautical facility on Camden airport. I would have to doublecheck this however.

PAUL OSCANYAN JR. was an operator at Richmond WEER for a good period of time then went on to PAA to establish a weather-reporting radio station Reyjavik, Iceland, for PAA in advance of their trans-Atlantic flights. Paul was a member of the Explorers' Club and came to Richmond after some time on the Greenland ice cap and then the famous schooner Morrissey. He suffered from snow-blindness and knew all the big time fliers, communications and meteorologists; when he left Washington (Where I last saw him) he went to Colorado Springs and was a Bird Colonel in the U.S.A.F. Reserve. I haven't been able to trace he and his wife. Astrid was a radio/operator on the Danish ship Disco and they had a romance on the air (When Paul was on the ice cap.) culminating in a marriage proposal on the air - needless to say all the Viking folks were listening in - on c.w. Astrid gave many lectures on Eskimo living throughout Virginia and, probably, in Washington at a later date.

QRM - problems in this area were very few. One unique case occurred at old station WEEN. Our close neighbor WOR helped solve it; Charlie Singer chief, Ed Franke assistant chief. We were getting long bursts of music finally identified as coming from WOR but the culprit turned out to be a disintegrating farm barbed wire fence close to WEEN from which signals bounced off, from WOR to WEEN, as a result of shock excitation. WOO opened up one day, snip-shore radiotelephone, and gave us some trouble but was soon cleared by equipment modifications. This was also about the time that the newspapers built up a big story about one of nearby truck farmers (the area was dotted with old farms) claiming he was receiving WOR on a newly installed filling in a tooth. Never did get positive clarification on that one and have noted some other claims not too long ago in other areas. (Off the track here - "another story" of interest but not pertinent to this paper.)

NAVAL AVIATION - Has always been radio conscious back into the old bases at Pensacola and facility at Annapolis. John Buddi, retired from EAL, chief at Spartanburg and then Miami, did flying in the open cockpit jobs and trailing antennas. Like the Army the Navy made optimum use of radio for spotting gunfire, air/sea rescue, reconnaisance - at first launched from battlewagon catapults which, in time, were adapted, for aircraft carriers minus the "charge" impetus. Rugged aircraft as radio equipment seemed to stand the strain and no problem now. My experience as communicator/operations assistant took in PBYs, PBMs, RBOs, R4Ds, R5Ds, various float craft in the North Atlantic, Atlantic seaboard and duty involving flying - was lucky to be a crew member aboard the first R5D turned over to the Navy at

(Continued on Page 38)



Flight of the NC-4

Herbert C. Rodd - Radio Officer NC-4

The three "Air Blazers" left Rockaway Beach on May 8th 1919 after a near tragedy with a hangar fire. The NC-4 labeled the "Lame-Duck" was forced down 100 miles off Chatham on Cape Cod due to engine trouble. They taxied to the Coast and rejoined the other craft after two days delay.

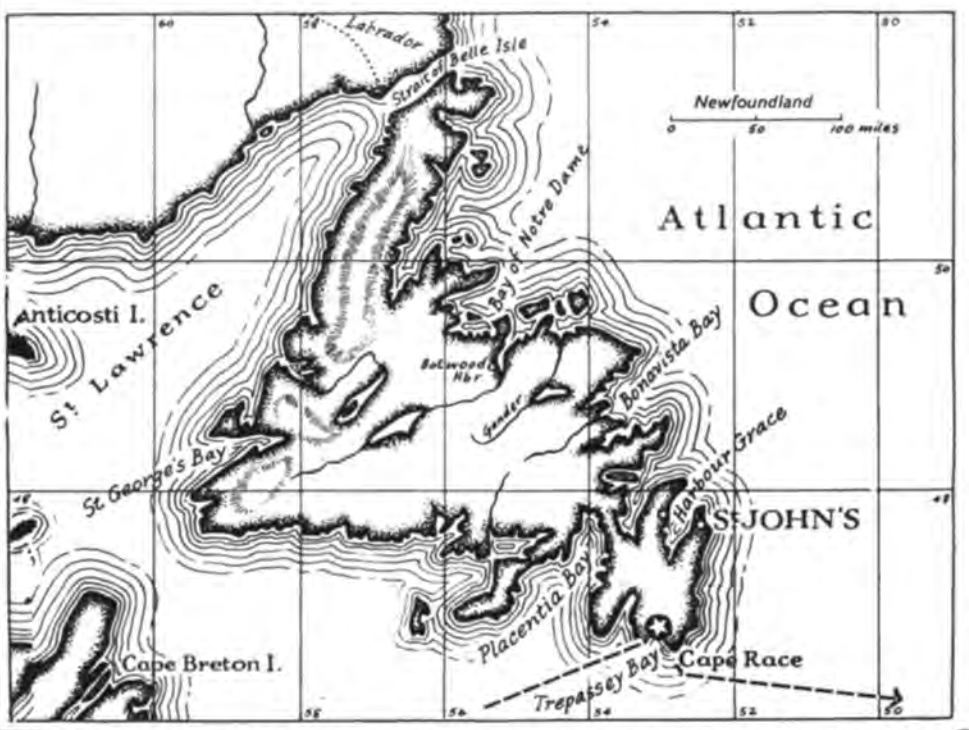
The Navy 'Trio' departed Trepassey Bay on May 16th 1919. Only one was to make it non-stop since two of the planes were forced down as they neared the Azores. The first to go was was NC-1 commanded by LC Patrick N.L. Bellinger and piloted by Marc. A. Mitscher. They drifted for nearly 6 hours during which time Radioman Harry Sadenwater tried to contact the destroyers on station. Afloat, the NC-1 had to use its small auxiliary transmitter which did not function too well. Adding to the problem were the destroyers themselves causing so much "QRM" that Sadenwater could hardly get through. Finally, they were picked out of the 'drink' by a Greek Freighter-the SS IONIA.

The NC-3 was forced down nearly two hundred miles short of Ponta Delgada. The Pilot, H.C. Richardson, attemped to taxi the 200 miles but it was 'touch and go' through the gale force winds and angry seas. To make matters worse, they were nearly capsized by the destroyer Harding as they neared the harbor. Radioman Robert A. Lavender, who supervised much of the installation of communications equipment in the NC's, experienced great difficulty in keeping contact due to the extreme buffeting and wind action.

The NC-4 landed at Horta in Fayal due to the fog at Ponta Delgada. They flew on to Lisbon on May 27th a distance of 768 miles; thence to Ferrol Spain May 30th, alighting near the mouth of the Mondego River in an estuary, due to a small gas leak which Commander Read thought should be checked. Taxiing up river for smoother water, they grounded on a sandbar. They were able to extricate themselves by applying full power to the engines while tilting the craft and walking on the wings. The ship took off without further problems and flew to Plymouth, England where it landed on the water in the harbor at the Cattewater moorings. A "Hero's Welcome" was showered on Commander Albert C. Read and his crew. While all of the crew deserved great praise for their near flawless efforts, it was Radioman Herbert C. Rodd who perhaps who commanded the greatest admiration and respect for his expertise - especially with his small direction-finder and ability to keep contact throughout the lengthy trip - 4320 miles and elapsed time of 53 hours 58 minutes. The Navy said ... "Well Done" !

Researched and written by W. A. Breniman

Departure Point from North America



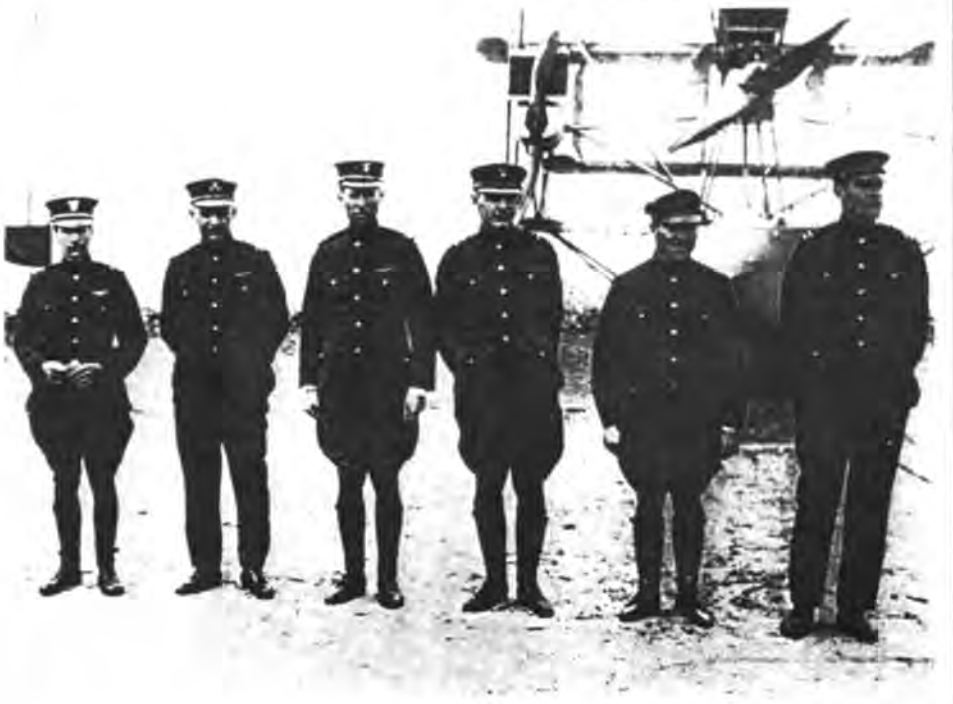
Herbert C. Rodd - Radio Officer NC-4

Born in Cleveland, he went to work for the Marconi Company as a Radio Officer on the SS Easland (WFN) which later turned over in the Chicago River with many casualties. Among ships he operated on the 'Lakes' was the SS Lakeland (WLD) from which he sent an SOS after running aground near Alpena, Michigan in a raging snow storm. Rodd helped to guide a salvage tug through blinding weather and the tug succeeded in pulling her into deep water and then towed the Lakeland to Port Huron. He also was posted at station WDR in Detroit, operated by the Marconi Co. When the United States entered the war he volunteered and was immediately given a CPO rating due to his experience. Much of his wartime assignment was at the Great Lakes Naval Station. After making Ensign he was transferred to Norfolk where his time was taken with aircraft radio. When the "NC" flight was being organized, he was selected for posting on the NC-4. His handling of the radio equipment as well as the DF set installed brought him great praise. We hope to publish Herbert Rodd's Radio Log of the trip in the next issue.

'Good-by America'

NC-4 TOP FLIGHT 1919

'Hello Europe' !



NC-4 Crew Members

Left to Right
Lt. Cmdr. Albert C. Read, C/O and Navigator
Lt. Elmer Stone, Pilot (From U.S.C.G.)
Lt. Walter Hinton, Copilot
Ensign. Herbert C. Rodd, Radio Officer
Chief Mech. Mate Edward H. Howard (*) Engr.
Lt. James L. Breese, Engineer
(*) Edw. Howard was injured before flight started and replaced by Eugene S. Rhoads.

AIRLINE FLIGHT RADIO OPERATING - WW-2

By WALTER D ROLLICK 1554-P

There were many non-military groups and organizations that provided services to aid the war effort following the bombing of Pearl Harbor in December 1941. However, little has been said about the U.S. airlines and how they took part in assisting the already overburdened Air Transport Command of the Air Force in carrying personnel and equipment overseas, using converted airline aircraft like the DC-3 and DC-4.

I joined Eastern Air Lines as a radio operator in Atlanta, Georgia in June 1940 after completing my assignment with Merchant and Miners Steamship Company in Baltimore, Maryland and the S.S. Berkshire KFIE. It is hard to believe that in this day of sophisticated data communications that there was a period in airline history when all of the traffic involving operations and reservations, was handled solely by CW in the early 1940's. Shipboard radio on the other hand, at least for the M & M ships was quite different and coverage consisted primarily of monitoring 500 Khz. It was not uncommon to call WSC in Tuckerton, N.J. or WCC in Chatham, Mass. to inquire about traffic just to get the rig fired up and use the key or bug. In contrast, operating station WEEA in Atlanta was a three shift 24 hour a day operation with almost continuous communications on CW or, if an aircraft watch was being covered, using 4122 or 2922 Khz. for either day or night contact with aircraft by ratiotelephone.

Early in 1942, Eastern management in Miami, headed by Don C. McRae and assisted by people like Vance Murr and R.A. McAvoy, put out an intra-company request for flight radio operators to man the cargo aircraft that would soon be placed into service in the newly formed Military Transport Division of Eastern Air Lines. It was then that we realized why the DC-3's were being modified in a secured hangar area. Although EAL started the operation with DC-3's, these were soon followed by the Curtis C-46 Commando twin-engine cargo aircraft.

Eastern operated three flights each day from Miami, departing at 30 minute intervals beginning at 0300. The destination was Natal, Brazil with intermediate stops in Puerto Rico, Trinidad, British Guiana and Belem, Brazil. Some flights continued on to Accra on the Gold Coast of Africa with a stop at Ascension Island in the mid-Atlantic. These trips took five or ten days respectively.

The radio equipment installed in the C-46's was considered "state-of-the-art" in 1942 and consisted of a MOPA BC-375 transmitter using four 211D's and a BC-348 general coverage receiver. The backup equipment used remotely controlled (mechanical tach shaft) "Command" transmitters and receivers that became so popular as mobile amateur installations after WW II. Anyone who ever changed bands in the BC-375 transmitter with the heavy tuning units, during turbulent conditions, can readily appreciate the arrival of modern technology. A manual and automatic direction finder (Bendix MN-62) made up the radio navigation portion of the electronics along with the IFF which provided a transponder unit for identification at military bases. A trailing wire antenna was used with the primary HF communications equipment and failure to reel in the antenna prior to landing, usually resulted in loss of the antenna weight.

The C-46 crew consisted of the Captain and First Officer as the pilots, and the radio operator, who later did double duty as a navigator. The cargo was made up mostly of critically needed supplies, medical equipment, aircraft maintenance parts and engines. Occasionally, a USO group would hitch a ride to one of the military bases in South America to provide entertainment for our troops. On March 8, 1943, one of our USO passengers was Martha Raye, the celebrated movie and stage actress, who held the title of Honorary Captain, U.S. Air Force.

Martha Raye proved to be a super stewardess during the flight to Natal, Brazil. Return flights to Miami, brought back the sick and wounded as well as survivors from torpedoed merchant ships. The urgently needed alumina ore Bauxite was also picked up in Georgetown, British Guiana and carried to Miami. It did not take many bags of this mineral to make a full load for the C-46.

My first flight as a flight radio operator was made in July, 1942, and after three and a half years and about 3500 hours of flight duty, I can recall a number of events, some sad and some humorous. All in all, Eastern's safety record for the MTD operation was superior and proved the worth of using experienced airline pilots and having airline type maintenance available. One of the tragedies involved an Eastern DC-3 which was taking off from Miami shortly after three a.m. on a routine flight to Brazil. At the same time, a B-25 was beginning its take-off roll on another runway, without lights and apparently without proper clearance, in preparation for its dawn submarine patrol. The two aircraft collided at the intersection of the runways and both pilots in the EAL DC-3 were killed. The radio operator, J.W. Bussey was thrown from the wreckage and found wandering in a daze and badly burned. He miraculously survived and is now retired from Eastern and lives in Tavernier, Florida. The other tragedy to mar Eastern's almost perfect safety record, was the crash of a C-46 in April 1943, with Captain Inman in command. I received the distress call from radio operator Dietz while assigned to the ground radio facility WEEM in Miami, monitoring the watch frequency of 11,960 Khz. Flight Radio Operators were required to spend one week every six months on duty at the ground radio station as part of a continuing training program. Dietz's distress call gave his position as Check Point E and advised that they had an engine fire and were going down. Check Point E was a position abeam of Cabo Cabron, cuba on a direct track from Miami to Borinquen Field in Puerto Rico. No trace of the aircraft or crew was ever found.

On the somewhat humorous side, I recall a flight from Belem to Natal. About thirty minutes into the flight, the Captain noticed an unusually high consumption of fuel and elected to make an emergency landing at Sao Luiz, Brazil. While preparing for the landing, the right engine caught fire, but it was extinguished with the CO2 system. The engine was shut down and I was instructed to notify Miami operations of our situation and that we would be landing shortly to evaluate the problem. I was unable to reach Miami and one of the other EAL aircraft in the vicinity offered to relay the message; I did not know at the time that our message had been incorrectly interpreted and the message Miami received said that we had an engine fire and were going down. A backup message given to Pan American after landing, never reached Miami and I suspect the rivalry between the two airlines may have had something to do with it. While Miami was preparing to get a search and rescue team underway, we were enjoying some cool refreshments at a sidewalk cafe as guests of the U.S. Rubber Development Corporation officials. It was not until my wife had been advised that I was missing and started receiving calls of condolences from parents and relatives that our true situation became known and our flight continued to Natal without further incident.

Eastern Air Lines was not the only airline to offer their services to the Air Transport Command since I believe that every major airline played some part in these operations. The dedication and service provided by many airline employees will someday be recognized as their merchant marine counterparts have been on many occasions.

"HEY WALT, IS THIS THE MSG YOU WERE LOOKING FOR ?"

BRASSPOUNDERS IN THE SKY

AVIATION

By- Earl W. Korf 613-SGP

Air Drama in WW 2

all messages had to be sent and received by SYKO code. That was another supersecret gadget which the radio operator kept on his person wherever he went; he had to guard it with his life.

After six weeks of ground training I had enough; I asked for flight duty. My job was turned over to another boy who was afrid to fly. I began my first trip on April 27th, 1942. This was the organization's ninth overseas flight; we left Washington for Karachi, India, with oh, so many way stops. The first was Morrison Field, West Palm Beach; then across Cuba and the Caribbean to Trinidad. It was a night flight-- a nightmare for us. Because navigation was dependent on star sightings, all long-distance flights were conducted at night. On the way to Trinidad there were almost continuous thunderstorms, heavy rains and flying in and out of clouds all the way. What few times a star was visible, the air was too turbulent to catch a sight. I believe we didn't have one definite fix on this ten-hour flight. The navigators were two ex-merchant-marine men; neither one had been checked out; They were unused to the bubble sextant and the unsteady deck of the plane; they got in each other's way, and so there was confusion. As radio operator I was not much help as I had trouble establishing contact through the heavy static and bad skip conditions. When we got within range, the Trinidad radio beacon was very helpful, and so we made it, all of us a bit weary and beat. We rested that day and left at night for Natal via Belem, Brazil. Our navigation was not much better on this leg but it was over land most of the way so that occasional ground fixes were obtained. We had another all-day rest in Natal, not looking forward to the first ocean crossing to the little rock called Ascension Island. We wondered how we were going to find this tiny dot in the middle of the Atlantic. However, our worries went for naught because the captain and the operations officer decided to send us out with only one navigator instead of two, since most of the trouble had been caused by the two men getting in each other's way and causing confusion. Consequently, from there on we had no further navigation worries. Both men were experienced ship navigators; they just needed some air experience. after which things worked out very well.

Ascension to Accra, across Africa to Cairo and then to Karachi; a couple of African shuttles, and back to Karachi where we picked up Jimmy Doolitle, bringing him back to Washington. This was three weeks after the famous Tokyo bombing raid. Although Jimmy was with us for a week he never divulged to us what his business had been; it was a great surprise to us when we read in the papers the morning after our arrival in Washington that FDR announced Doolittle had been the leader of that raid. I never met Jimmy again although I did get his short-snorter signature(3).

My second trip was from Washington to Montreal, Gander and Prestwick. Returning, we fueled for Gander.

Immediately after the Pearl Harbor attack on 7 Dec. 1941, the major airlines such as Pan-Am, American, Eastern and Northeast, were awarded ATC (1) contracts by the Army Air Corps to operate planes for the Army. A similar operation was conducted by the Navy, called NATS. Civilian crews were retained to operate Army planes, always under Army orders; they wore ATC uniforms similar to regular Air Corps.

Transworld Airlines (TWA) participated in this operation; this story is about the radio operators on that line.

The "day of infamy" found me at Burbank, California on the four-to-midnight shift as TWA ground radio operator with Johnnie Hultquist (SOWP 211-P) as CHOP. These were hectic days and nights with so many rumors and scares about the Japanese being about ready to take over California. Many jittery and trigger-happy anti-aircraft operators fired at anything in the sky.

Being too young at the time I missed the first world war but I was determined to get into this one. I therefore applied to the Navy to see action from a destroyer, or on some other sea duty. The recruiting officer at once blasted my hopes; he said I was too old for sea or combat duty, but he would give me a nice, easy, safe job teaching radio at San Diego Naval base. That wasn't for me; I turned it down. At the age of 38 and working in a defense job, I wouldn't be drafted in any event, but I was still restless. A week later I heard that TWA was setting up an ATC base at Washington National Airport where they were recruiting flight crews.

In February, 1942 I went to Washington as instructor and check radio operator. TWA had turned over their five Boeing 307 Stratoliners to the Army; these were being fitted with extra cabin fuel tanks, long-distance radio gear and over-water survival gear. Crash courses were being given to flight crews. Some of the radiomen were ground radio operators with cw experience but a number were young boys out of high school or college with ham radio backgrounds. Midland Radio School in Kansas City graduated many of these youngsters before arriving in Washington for finals and checkouts.

George Osborn (SOWP 3087-P) with Frank Stubbs (SOWP 2237-V) were in charge at Washington; they were the engineers who installed all the radio gear and kept it working. (Frank was recently a Silent Key). The "Strats" were fitted with the Command Type radio transmitters SCR274N/AN1ARC5, also good old reliable BC348 multiband receivers. Loading coils were installed for operating on 500 kcs, with trailing wire antennas. The supersecret IFF (2) was used.. Of course but when we arrived, all of Newfoundland was socked in with fog, including Goose and Moncton. The nearest clear airport was Presque Isle which we headed for without expecting to reach it, but make it we did, landing with empty fuel tanks, or at least not enough fuel to measure. We had flown 16½ hours on a scheduled 12-hour flight.

(Continued from Page 22)

DURING THE 1930s, TWA was known as "The Lindbergh Line." This historic photo of a DC-3 flying over New York Harbor foreshadowed aviation's supremacy. The liner Normandie, pictured here, was to burn and capsize at its berth. Next month the last of the great oceanliners, *France,* is scheduled to cross the Atlantic for the last time.

GENERALS EISENHOWER AND MARK CLARK TO LONDON

On June 23, 1942, we flew from Washington to London via Gander and Prestwick. As usual our passengers were Army officers. The fact is, our Boeing Stratoliners were the most comfortable planes for our brass to fly in. They had very roomy seats in the cabins and in addition all were equipped with six to ten sleeping berths; it is no wonder we were the VIP airline. On this trip none of our passengers came to the cockpit; they spent their time in the cabin, some sleeping in the berths, others playing cards; and some studying maps and papers. The radio operator and the navigator had very long duty hours. When we arrived at London (the Polish fighter airport at Northolt) we were more than ready for the sack which turned out to be at the Mount Royal Hotel. In the morning the London papers had Ike and Mark all over the front page with pictures, telling how they had arrived the day before and announcing that Ike was the new commander of all U.S. forces. It is a matter of history that General Clark headed the North African invasion forces. It was therefore quite possible that Ike and Mark spent most of their time on that flight going over those plans. If the enemy had known about the flight, we may have been shot down, and world history could have been changed. I didn't get their short-snorter signatures. As with Doolitle I never met these men again.

I must note that early in 1942, all flights to Europe and Africa were routed via the South Atlantic because it was thought impossible to fly the North Atlantic in winter. This theory was challenged in late 1942 and 1943 when it became routine to fly the northern route throughout the year--of course, with some weather delays.

On August 1, 1942, I went to Natal for a four month stay, shuttling back and forth to Accra on the Gold Coast. All aircraft was pressed into service during this busy time, ferrying men and supplies to Europe and North Africa. It was part of the build-up for the North African invasion. By staging crews at Natal and Accra we could keep the planes flying day and night. In Natal we first stayed at the Pan Am staff house, moving later to the Paramarin Field. All the airlines and the Army had crews based in Natal. We had merry times visiting the Wonder Bar and sweating out the taxi ride to town in those Brazilian taxicabs with

EARL W. KORF
613-SGP

"Earl" became a professional wireless operator in 1924 when he was assigned to the SS Sea Ranger/KDSQ. After being shipwrecked in the South Seas on the Barkentine Mary Winkleman and spending several years with Alaska Packers he joined TWA in 1930 and work ed at many of their PT-to-Pt ground stations. He became a "FRO" (Flight Radio Officer) in 1942 and shifted to "Flight Naviator" for TWA in 1944. He retired from TWA in 1964 after 34-years service. Earl has been one of the Society's Directors and 'wingmen' for over 10 years. His original Amateur call in 1920 was "6WX". Now his call is K2IC. He is very active on the Society's nets. For diversion he climbs mountains and runs in marathon races as the opportunity prevails.

(Continued on Page 24)

Giant of the Airways—TWA's Stratoliner! 107 foot wing span; 74 foot overall length; 17 foot overall height.

TWA—KORF

(Continued on Page 23)

the crazy drivers who knew only two speeds: stop and full throttle. Flying the Pond was more relaxing than this thirty-minute taxi ride.

We were flying our tails off; many records were broken. In one thirty-day period, I made sixteen crossings with a total of 220 flying hours.

We used cw almost exclusively. Many flights were made with QDM(4) and QTE calls for landfall. Early trips to Ascension were made with only one radio navigational aid: QTE's from the British marine station on the Rock on 500 kcs. We had double crews on many of our flights, that is, three pilots and two engineers; but only one radio operator and one navigator. There were two bunks in the crew compartment so that some one could be resting. Very little bunk time was allotted to the navigator and the radio operator as we were on duty during the entire crossing; Isuppose we were considered expendable.

THE FOUR-ENGINE GLIDER CLUB

A number of C-87s were assigned to our unit. These were the cargo/passenger version of the B-24. We welcomed these planes because their turbo-supercharged engines eliminated the Boeing's bad feature of ignition shorts due to moisture during periods of heavy rains which occur along that intra-tropical front. However, the C-87 also had a bad feature: the newly installed cabin fuel tanks and the Rube Goldberg system of valves, hoses and lines for transferring fuel. Our engineer, Fritz Wolf,was not altogether familiar with this system as a result of which one dark night 800 miles from land we joined the "four-engine glider club." The main tanks ran dry and while Fritz was working valves in various combinations in a bit of a panic, we dropped from 8000 feet to 1000 before he made the right move to restore power. Hardly a word was spoken during those few minutes until the engines came back in. Captain Eischeid said merely, "Well, Fritz, I see you got 'em on again."

FIRST FATALITY

In August, after five months of operations, we lost our first plane, a C-87, which disappeared one night between Natal and Ascension. Some think a submarine shot him down because there were many U-boats along the supply routes. Many of us had been shot at before. Others thought that an explosion from a leaky gas valve caused the crash. Searchers failed to find any trace of the plane. The radio operator was 19-year old Bobby Dowker, a college student, making his first ocean crossing.

MADAME CHANG KAI-SHEK COMES TO AMERICA

In November, 1942 I was radio operator on a Stratoliner which brought the Chinese lady to Washington from Chungking, to obtain medical treatment and to solicit more military aid for China. From Chungking to Natal the trip was routine but on a dark, cloud-covered night on the way to Trinidad we lost an engine over the Brazilian jungles eight hours from Natal without any star sighting. Our position was in doubt and we had to look for an emergency field. A safe altitude could be maintained with three engines but if we lost another one it would be tough. The closest field was Zandary, Georgetown, BWI. We had a rough time getting word to Zandary to ask them to turn on their radio beacon. Due to skip we had to relay through Meeks and Ascension. The final twenty minutes was on two engines as we lost all oil in the second engine and had to shut it off; it didn't matter as we were now descending. We spent all day at Zandary for repairs, and then on to Washington.

PLANE SHOT DOWN BY ERROR

In November, 1942, we lost our second C-87 when it was shot down off Casablanca. Mr Goucher was the FRO on a cargo flight from the Azores; it was shot down by an RAF fighter plane which was protecting a large U.S. convoy just prior to the North African invasion. The RAF pilot thought it was a German FW-200; the plane was apparently too close to the convoy. We had been instructed to avoid convoys but we were seldom told their locations.

FIRST DC-4 SHOT DOWN BY A GERMAN SUB.

In December of 1942 we received the brand new C-54, DC-4 or Skymaster as the British called them. This was a great improvement over the Boeing Stratoliner as the DC-4 carried a larger load: it also had

FLYING MILITARY MISSIONS AROUND THE WORLD

greater range and speed. The first one to fly south from Washington for Natal and Accra left with a large crew of supervisory personnel in all departments for training purposes. It was loaded with DC-4 parts, spares and supplies for our bases along the way; it's loss was therefore a severe blow to TWA and the Army since so many skilled and invaluable men were lost. The radiomen were: check operator Lennie LaFrank, and student operator Leo Moriarty. The plane had left Piarco Field in Trinidad for Natal. It never arrived.

Here I will let Johnnie Ochocki (SOWP 1922-SGP and a Chapter member) tell the story, as he was there.

> "This was a near miss for me as I was assigned to this plane but the navigator on the following plane placed his gear on my ship in error. Since I was senior I made the decision to let things stand as they were; I changed my gear back to his plane which was the following plane. A German sub was ambushed in one of the rivers of French Guiana (still Vichy French); it shot the plane down. We had followed him from Washington to Trinidad; all of us had dinner with their crew. He left first because we were delayed with starter trouble. We were thirty minutes behind him and were also fired upon. Through my navigator's astrodome I saw three AA shells come through the overcast at 9000 feet dead ahead of us; it was reported by radio. Captain Dally was already down in flames at the time. Native boatmen observed the entire disaster in which the plane came down in flames with one wing broken off. It landed near Cayenne on the Nazi French border. Beside the loss of all personnel, the Army lost a payroll of several million dollars."

Johnnie has another near miss reported later in this story.

CASABLANCA CONFERENCES

Pan-Am and TWA were the chief units of ATC which furnished transportation for FDR and other high U.S. officials in January of 1943. I was the FRO on the backup DC-4 for the President. We carried his and the press corps' baggage and were hoping we could carry Roosevelt in person. The closest we got was on the trip over the desert to Roberts Field, Liberia. Security was very tight as we were not beyond the range of the long-range bombers the Nazis had in Spanish Morocco. Just after daylight the inclined ramp was pushed up to our plane for FDR's entrance but just before the President got out of his car we were ordered to move away; the other DC-4 took our

(Continued Next Page)

Flying The Hump—At Night ?

place and FDR boarded it. This was obviously a ruse to fox the enemy. At any rate we escorted them to Liberia and back to Bathhurst, acting as a decoy. We brought back Admiral King and his staff. I believe FDR returned by ship.

SECOND TRIP TO CHINA WITH MADAME CHIANG KAI-SHEK

From March through June, 1943, I was stationed in Natal performing the South Atlantic shuttle to Accra and back. In late June I was instructed to return to the States as the Madame was ready to return to China; she asked for the same crew to take her back. She and her party boarded our plane at LaGuardia on June 25th. She had arrived at LGA with two large vans full of things she expected to load in the DC-4: hundreds of articles for her homeland such as radios, refrigerators, washing machines, canned foods, sewing machines, etc. As there were only six in her party she expected to have the rest of the cabin and both cargo compartments for her goods, and never mind the fuel. Permission to take aboard the contents of one of the vans was denied; we were right up to MGL(6). Even at that we had to monitor our fuel carefully and to plan to make many fuel stops. On the way via Natal, Ascension Island, Africa and Karachi, and all the base stops for rest and fuel, Army officials showered her with presents--which kept increasing our weight. One C.O. at Georgetown gave her ten cases of whiskey. By the time we reached India we were literally loaded to the gills.

LOST OVER THE HUMP

At Karachi the plan was to fly to Calcutta for an overnight stay; then to Chabua, North India and over the Hump to Chungking. Because of very severe thunderstorms we couldn't reach Calcutta so we landed at Gaya in the early evening. Very little briefing was available at Gaya for China weather, or for navigational or radio facilities. We had expected to pick up this information at Chabua the next day. The captain made the unwise decision to fly direct to Chungking at night over the Hump. What he should have known (and didn't) was that there was no Hump flying at night; no radio beacons were operating and very few communication watches at night. He did send a landline message to Chabua, outlining our plans. So, without rest we headed east across the high mountains and enemy-held Burma, with a high-priority prize aboard--if the Japanese had only known of our flight. I was instructed to maintain radio silence; consequently there was not much to do. The poor navigator had his problems. For four hours we flew with no navigational aids: no drift, no star sights, no radio beacons. A line of severe thunderstorms parallelled our course with resultant very rough air. We were constantly flying in and out of clouds, We tried to climb on top for star sights but because of the heavy load we couldn't get above 17,000, and there were 22,000-foot peaks all around. In addition, we encountered severe icing problems which contributed to excessive fuel consumption. Obviously, we were in a tough spot. At this rate of fuel use we couldn't possibly reach our destination, even if we could locate ourselves. We therefore immediately made a 180° turn, hoping to make Chabua before running out of gas. We all admitted we were scared. The chances are we were over Japanese lines; if we had to land for lack of fuel, even if we survived a landing in the mountains, the Japanese would find us and we could spend the rest of the war in prison camp. Now was the time to break radio silence; luckily I was able to raise Chabua on 5660, voice. In the clear we didn't want to say whom our passengers were; just that we were an American plane in trouble which required the Chabua beacon turned on for our guidance there. The operator at Chabua had some suspicion that we were a Japanese bomber speaking in English. At first he refused to turn on his beacon. More pleas from us, and each of our five crew members spoke a few words of good old American slang with which we finally convinced him we were indeed Yanks. He turned on his beacon, which was rather weak at first as we were some distance away. At last we homed in on it and landed at Chabua after eight hours of flying, landing with only twenty minutes of fuel left. The reason Chabua knew nothing about our flight is that the message we sent from Gaya didn't arrive until we did.

We fueled, were briefed, and then continued on to Chungking without further incident. We spent four lovely rainy days there, working on the engines by day and wining and dining at night with Madame Chiang and Generalissimo Chang Kai-Shek who decorated us all with the Chinese Cloud and Banner, the second-highest Chinese award. We also dined with General "Vinegar" Joe Stillwell. With us on the return flight was a group of Chinese pilots going to the States for training. On that flight we got our first and only view of Mount Everest.

Some American newspapers reported that we had been forced down and captured by the Japanese. This didn't set so well with our families until they were told, upon concerned inquiry, that the report was in error.

ANOTHER PLANE LOST

In 1943 we lost another DC-4 between Iceland and Newfoundland, apparently shot down either by a submarine or a long-range bomber. Young Bill Somers was FRO. Particularly sad was the fact that this flight had a load of war-injured litter patients with a number of nurses.

AUGUST 1943 CATASTROPHE (ALMOST)

FRO Harry Stitzel (non-member) reports the following near-miss over the Atlantic:

> "This was my first trip, having been checked out by FRO Chuck Glover. We were flying the Stratoliner COMANCHE between Iceland and Gander at 1000 feet in heavy turbulence trying to keep under clouds and ice. The captain was aft in the john when suddenly all engines began roaring and the plane went into a near-vertical bank. I was standing with phones on and was forced to the deck. It looked like we had it. The copilot said he saw many streaks going by the windshield; he then looked down to see we were directly over a surface vessel which was shooting like mad at us. Then we heard a loud muffled thud and flew into a cloudbank. Captain Randy Churchill came charging through the cockpit door, holding up his pants. The engineer found a large hole just abaft the john. The bullet or shell had torn jagged holes near the elevator and rudder controls. We notified Gander and continued for six more hours. This communication was in plain language.
>
> Temporary repairs were made in Gander but when we arrived in Washington it was found that one of the control cables was holding by only one or two strands. It had been overlooked in Gander because it was lying in the groove of a pulley at inspection. Rather close shave I would say."

NORTH ATLANTIC WEATHER SURVEYS

This service was established by the Army in December 1943, allotting one plane each to TWA, American and the Army North Atlantic Wing of the ATC. TWA's plane was C-54 No.310. Three crews were assigned to 310, I being the FRO on one crew captained by Dutch Holloway. We spent the next three months shuttling over the North Atlantic, always with full tanks of gas and carrying Army cargoes, weight permitting. We flew in all kinds of weather collecting weather data and radioing it back to headquarters. Special radio, weather and navigational gear was installed on 310 to assist us in this project. For my part, my new toy was the late Collins ART13 crystal-controlled transmitter. It was nice to get rid of the old frequency meter. This was a beautiful transmitter; many of them are still in use today, after forty years, as hams who have them will testify. We also had a radio altimeter and a loran receiver. Both Army and TWA carried experienced meteorologists. I believe this was the first time the ART13 was used. We pioneered in making the North Atlantic safe for winter flying.

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TWA

KORF

(Continued from Page 25)

On our last trip at the end of March we had an engine failure out of Iceland and had to return for a four-day stay at Meeks Field for engine change. We all recall those Nissen huts at Meeks. After the engine change we headed for Gander into some pretty foul weather. Dutch knew it would be our last trip on the weather survey; we had not yet flown north of the Arctic Circle. The only station above that Circle was BW8 (Sonderstrom) where the "Blue Nose Bastard" certificates were given out. Dutch told us we just had to get these certificates; he had me send a message to Gander advising that we were diverting to BW8 on account of a rough engine. We got out of the bad weather and flew into Sonderstrom in CAVU (6) weather. We landed, had lunch, checked the engines and then got our Blue Nose certificates, after which we proceeded to Gander where we caught hell from the Army C.O. But we didn't care; we had our coveted certificates. It was our last weather trip anyway.

This was also my last trip as radio operator. I had been studying navigation and on May 1st I gave up top seniority on the radio operators' list to become the bottom one on the navigators' list. Everyone thought I was crazy but I had several good reasons for the change. The pay was much better, the work was easier (as I thought then) and more challenging. I got tired of standing a twelve-hour watch with headphones through tropical QRN, skip, fighting that darn SYKO code and listening to enemy jamming, etc. while the navigator would take his three-star fix, work it out and be through in fifteen minutes, then spend the rest of the hour reading a book. Later on, as navigator I didn't find it all that easy; more than once I wished I had stayed with radio. But in the long run I came out ahead: all radio operators were phased out on the Atlantic in 1958 when cockpit voice communications were approved. It took ten more years before navigators went out.

1944: TWO MORE LOSSES

A cargo DC-4 flight with FRO Harry Cumberland flew smack into Mount Katahdin in Maine. They were on the last leg of a long trip from Europe and had just checked in to the U.S. airways where the navigator and the radio operator went off duty. The tragedy may have been caused by inaccurate weather data or extreme drift, but I believe someone was asleep at the switch. The flight plan called for a large change in course fifty miles east of Katahdin, which would have headed them for Bangor to the south but apparently this course change never took place. They were too low in altitude for night flying in that area and cruising at 5000 feet. They hit the peak 250 feet from the top.

Another casualty was a DC-4 at Lagens, Azores. This accident was seen by Johnnie Ochocki who tells it thus:

> "We had landed shortly before after aborting two passes due to extreme turbulence. The runway was built between two rock cliffs; one of the worst fields to get into. The plane was forced below the rock cliffs, hitting the end of the runway and taking off some gear and the left wing. Then the plane caught fire. The pilot and copilot went through the windshield but by a miracle they survived. All the GI passengers escaped but the navigator and radio operator George Harvard died. These two were later posthumously awarded the Distinguished Flying Cross; they were buried on the island."

AIRPLANE WRECKED BUT CREW SAVED

On May 12th, 1944, with John Ochocki in another near miss; he tells this story:

> "At 2200 double daylight time on Harmon Field, Stephenville, NF, DC-4 No.942 with twelve nurses, eight majors and 3100 gallons of gas, took off for Prestwick. Just before lift-off the locking pin on the nose gear broke, putting the plane down on its nose, the propeller digging into the runway and the engines ripped loose from the wings and headed for the sand dunes. The propeller exploded and splintered the gas tanks and the forward fuselage. The ship stopped 50 yards from the end of the runway with St George's Bay right in front of us. When the plane stopped, the after section broke into flames, but we got every one out through the forward cockpit door--just before the whole plane went up in flames. We lost everything but the clothes on our backs."

FRO was Wally Hall who, like Johnnie Ochoki, had survived two previous crashes.

1930 - CRESSON, PA
Earl Korf, Relief Operator on duty.
Station took weather observations and handled contacts with TWA planes enroute.

I SLEPT WITH MARLENE DIETRICH

But life in these operations was not all that tragic and fearsome. We had our moments of mirth, such, for example as one flight out of the Azores when we were carrying a USO troupe including Marlene Dietrich. The captain allowed her to rest in one of our cockpit berths which was wide enough for two persons. The captain saw a chance for some fun: he allowed each one of the crew to crawl in beside Marlene for a short while; it would be a nice story to tell the folks back home. We all took turns in the bunk with Marlene but she was so tired that she was out like a light as soon as she hit the sack, and so completely oblivious to us. Those entertainers really worked hard to entertain our armed forces overseas so that when it was time to leave they were quite exhausted. And then there was a certain general having breakfast in Accra. He got very upset when he was served scrambled eggs instead of sunnyside up. I had to explain to him that there was only one way to cook dried egg.

Charlie Pulliam (SOWP 3480-P) and another FRO on ATC told of hearing an SOS or Mayday. It was from a Liberator eastbound, which must have been very close as his signals were very loud. They had lost four engines in icing; the radio operator was very busy with 5SJ (Prestwick). Turned out they didn't need any help as they had finally got the engines back on.

BOEING 307: STRATOLINER C-75

I have a warm spot in my heart for those grand old airplanes. Boeing built the first one in 1939; it crashed with all hands on a test hop; the chief pilots of several airlines including TWA were aboard. The cause was found and corrected; consequently they built eight more: five to TWA and three to Pan-Am. In late 1939, TWA put the five in service coast-to-coast. These were the first pressurized cabin transport planes. They could fly at an altitude of 20,000 feet with cabin pressure equivalent to 5000 feet. Flying close to stratosphere altitude gave them the name Stratoliner. The point was thus stretched a bit because the stratosphere begins at about 30,000 feet. These craft carried thirty passengers including six comfortable sleeping berths. At the beginning of the war the pressurization was omitted to allow for the installation of cabin extra fuel tanks and overwater life-saving equipment; but there were still 20 seats and six berths. However, with the coming of the DC-4 the Strats could not compete in speed, range or payload, but toward the end of the war they flew cargo to the Caribbean and the east coast of South America. After the war the Strats were used for awhile on TWA domestic lines; but the new Lockheed Constellations put them out of business. They were sold to a French charter company. The old Strats entered another war when the French used them in Indo-China against the Vietnamese in 1954. They were not heard from again until 1958. I made a trip to Vientiane, Laos, and found all five of these planes on the ground still under French registry and they were still active. On my visit aboard one of the planes I found much of the original TWA equipment, such as instruments and radio gear still operable. There was no further news of these planes until about 1977, when we heard that one had crashed in North Africa; this was the first crash in almost forty years of flying. Today it is believed that the four remaining planes are still flying. That's an airplane! I don't know what happened to the Pan-Am Boeings.

I would like to say a few words about our co-workers on the ground--the AACS boys who made life much easier for us fly-boys. They had to endure the hardships of some pretty tough and isolated spots for long periods: such places as the "Rock"- Ascension Island, the Azores and Iceland. Our hats are off to that wonderful bunch of Army Air Corps Radiomen.

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MEMORIAL FOR RADIO OPERATORS

It is hoped that a fitting memorial can be established for those brave lads who lost their lives for their country - one similar to the Battery Park (NYC) The following names should be on the plaque:

HARRY CUMBERLAND
BOBBY DOWKER
Mr. GOUCHER
GEORGE HARVARD
DUDLEY HILL (Killed in accident at Shannon, 1946)
LENNIE LaFRANK
LEO MORIARTY
BILL SOMERS
HERBIE STILES (Killed in accident near Cairo, 1950)

My memory of forty years back is a bit dim. Nevertheless I wish to thank the following who furnished information for this story:

CHARLIE PULLIAM, FRO (SOWP 3480-P)
HARRY STITZEL, FRO (non-member)
ROGER GOLDTHORPE, FRO (non-member)
JOHNNIE OCHOCKI, Navig. (SOWP 1922-SGP)

Two other radiomen (both SOWP members) for us during the war, recently became Silent Keys:

EMILE (ED) LaROSE (3338-P) FRO
FRANK STUBBS (2237-V) Ground radioman at Washington.

Also Navigator GEORGE LUCEY (SK) (SOWP 3125-P)

Our present SOWP roster lists the following men who served with us during this wartime ATC operation:

CLIFF BRUCE	EARL KORF	CHAS. PULLIAM
BERT GUNTHER	CHAS. MORRISON	BILL.STEMPL
JACK HARRIS	GEORGE OSBORN	JOHN OCHOCKI

(My apologies if I have omitted anyone)

The era of TWA Flight Radio Operators ended in 1958; their duties became superfluous when cockpit radiophone communications were approved by the FAA.

NOTES

(1) p.1: ATC = Air Transport Command
(2) p.1: IFF = Information (or Identification) friend or foe.
(3) p.2: Short-snorter = "I was initiated into the 'Short-Snorters Club' enroute to HU; a new member was required to pay one dollar to each person present at his initiation; they in turn placed their signatures on one-dollar bills as evidence. . . I still have that dollar bill which I cherish highly. During WW-2 a person making his first military overseas flight was required to become a Short Snorter. After becoming a member I could challenge any other military person as to his membership in the Short Snorters; if he could not produce evidence of membership he was required to pay all others present one dollar each. My initiation into the Short Snorters cost me about $20. That was expensive but it was fun. I think I recouped one or two bucks from my initiation."-Ray Walling (SOWP 1275-SGP); Jan.1979.
(4) p.4: QDM ="What is my true magnetic bearing?" (Similar to QTE). QDM was used to home in to airports where the ground station took a bearing on the plane. We did not have to convert to QTE as QDM was used with plane's magnetic compass.
(5) p.6: MGL = Maximum Gross Load; The maximum weight the plane can take off with safely, including passengers, cargo and fuel. We were never supposed to exceed this weight but during the war we sometimes fudged a little (a few times).
(6) p.9: CAVU = Ceiling and Visibility Unlimited; perfect weather for flying.

-- Earl W. Korf 613-SGP K2IC

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Editorial Comment

Abbreviations used in Earl Korf's historical record are listed under "NOTES" above. The page numbers shown by the author referred to his manuscript and have become lost in pagniation of the Journal. They are however included for reference if needed.

MRO's (Marine Radio Operators or Radio Officers if you please, have had their share of thrills but I think after reading Earl Korf's story, most will agree that they "Fly-Boys" hold top honor in the "Thrill" department. An airplane is not as forgiving as a ship and errors often become terminal whereas a ship can bob around for days unless on fire or hit in enemy action. A well-earned Salute to all FRO's and those who flew the skyways.

HE SETS A TRANSCONTINENTAL RECORD

JACK FRYE

CONTACT ! JACK FRYE, V.P. (Later President) Trans-World Air Lines about to take off and break the trans-continental record as pilot of his DC-2, the forerunner of the DC-3 which became the 'work-horse' of the passenger airlines. This was the last flight before the cancellations on Feb. 19 1934 and the Army Air Corps took over flying of the mail, making history in perverse manner in what later was called the 'Suiside Mission". The cost of safety and progress comes high. Those aboard the HMS Titanic who lost their lives did not do so in vain. It was to trigger the promulgation of laws and regulations which in the years have saved lives. The same may be said of the impact taking over of Flying the Mail' by the Army Air Corps. Costly in lives caused by flying obsolete equipment and the endless accidents, never-the-less this era of aviation history was to revolutionize the standards, quality and dependability of aircraft [and airways] to our present day standards which boast of one of the best safety records in the world. Gone are the Jenny's, the DH's ('Flaming Coffins') , Converted Keystone bombers, etc. Now we have radar instead of road=maps and radio ranges, instrument landing systems and many dependable electronic mavels to safeguard our flying.

The Editor pays personal tribute to Jack Frye as it was Jack who taught him to 'jockey' a Jenny with OX-5 motor back in 1924 at the Burdette Airport on Western Avenue in LAX. Jack was a wonderful instructor and my mentor as I felt he was a man of destiny - which he became in later years. *W.A.B.*

"KEEPING CONTACT"

ELMER H. BURGMAN in plane receiving new set from FRANK KENNEDY at right. They were completely rebuilt from original installation. Pix appeared in Popular Mechanics issue Sept. 8 1930. Elmer built and modified much of TWA's early equipt. He went on to important supervisor positions with TWA. Retired, he is now Chief Staff Aide at HQ. SOWP No. 484-P (W6EB). He wears many hats at HQ. Last was setting headlines for this edition of SJ.

BRINGING SAFETY TO COMMERCIAL AVIATION

ARINC's First 50 Years, Communications Pioneer

by Ed Betts

"ARINC . . . TWA 96 . . . OFF REPORT".

"TWA 96 . . . GO AHEAD", is the reply from the radio operator answering the ground, nearly 400 miles away.

"TWA 96 . . . PLANE 11005 . . . OUT LAX 2345 (Greenwich time) . . . OFF 2351 . . . FUEL 76,000 (pounds) . . . ETA KANSAS CITY 0225". The ARINC operator acknowledges the message and records the report. It is then transmitted by way of ARINC's Electronic Switching System (ESS) and private telephone lines that lead to, and automatically update, TWA's computerized flight planning and monitoring programs. Within minutes, every concerned office will have access to the information regarding the progress of flight 96 through the computer readout.

This example of a simple radio contact, standard in format, is but one of some 750,000 radio transmissions made each year between TWA crews aloft and operations offices on the ground that are handled by Aeronautical Radio Inc. (ARINC) facilities. The locale could be anywhere on the TWA domestic system.

ARINC maintains nearly 300 VHF (very high frequency) radio stations, strategically located so that a jet flying at speeds near 600mph will always be "in range" for communications. These satellite stations are interconnected to 56 different networks by more than 64,000 miles of leased telephone lines that lead to one of the central receiving and sending centers located at SFO, CHI, and NYC. At certain gateway points for overseas flights, and across the Gulf of Mexico, extra-powerful radios and antennae are used for extended VHF capabilities. Once out of range for VHF reception, HF (high frequency) radios are used.

In the example given, the flight had departed from LAX and, shortly after takeoff, had radioed the message. The receiving operator was, in this case, answering from the center at SFO. "OFF REPORT" designates the type of off-message to be transmitted, and is the key as to how the ESS will route pertinent data to various TWA offices or departments. Reports of a special nature, such as weather, maintenance and special handling, are routed directly to the office concerned.

The fleet number, along with the OUT and OFF times, serves several purposes. The type of plane utilized for the flight is confirmed. Maintenance and overhaul computers will be logging the aircraft and engine times; other offices such as flight dispatch, crew and equipment planning, system performance, and fuel management will also receive updates.

For air travelers, the most important item is the ETA (estimated time of arrival). The ETA, as given by the crew of Flight 96, will soon be displayed on the TV screens and solari boards at intermediate and destination stations. If, perchance, the flight is estimating over 15 minutes late, a red light will flash and alert interested parties that a non-routine message is stored in the computer. The flight crew, while enroute, will update the ETA if the original estimate varies by 10 minutes.

Direct radio contacts can also be made between flight crews and dispatch or maintenance engineers for operational purposes, thus saving valuable time and possible flight delays. All TWA aircraft are equipped with a discrete, or separate, code for selective calling (SELCAL). If a message or contact is intended for a particular flight, the ARINC operator can alert the crew with an oral and visual signal in the cockpit that they "are wanted on the phone." In the example for Flight 96, plane #11005 is permanently assigned to code DH-AC for SELCAL purposes.

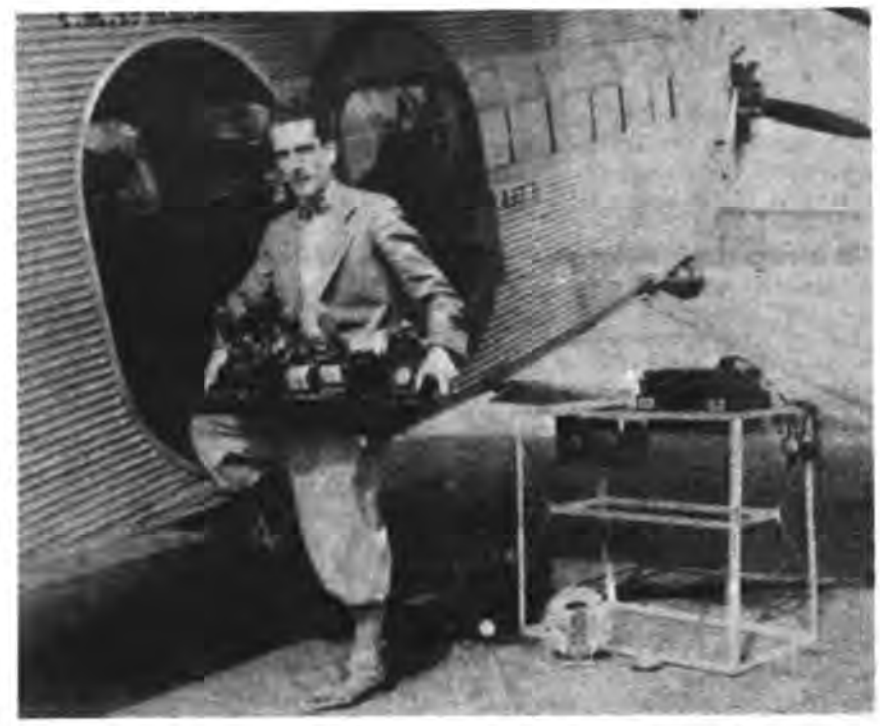
TWA's VHF Network

Although not connected to the ARINC network, TWA flights are also in direct radio conversation with ramp control and maintenance at every terminal served. These VHF stations (licensed through ARINC) are operated by TWA personnel (or cooperating airline) and are local in range (aircraft below 10,000' and within 50 miles) for advising gate assignments, maintenance problems, and special handling for passengers.

The final flight report as given to, and relayed by, ARINC will include the landed and block-in times and fuel on board at arrival, which will again update the data stored in various TWA computers.

In our modern, computerized age, this all sounds so simple. However, over a half century of research and development has preceded this example of a routine radio contact between aircraft and ground. The first successful experiments date back to 1913. In the war-years that followed there was little or no progress. With the end of hostilities, however, commercial airlines (all government owned or heavily subsidized) began carrying passengers between England, France, Germany and Holland. The first air/ground radios for commercial airliners were used in 1919 on flights between London and Paris.

The European system used a long-wave type frequency that was suitable for both communications and navigation. For navigation it required two ground operators to establish a bearing from their station to the aircraft (while the plane transmitted a signal). Then by triangulation, with two lines crossing on a map, the pilot could be advised of his position. It worked, but it was not too accurate because the plane could travel many miles while the plotting was worked out.



TAT's late 1929 radio equipment was bulky. In order to transmit, a trailing antenna with three-pound "fish" (weight) — lying on ground at right in above photo — had to be unreeled from the airplane.

During the early 20's, commercial aviation in the U.S. had taken a different approach. Mail came first, passengers were only an afterthought. Originally the mail was flown by the Post Office, with its own crews and surplus war planes. By 1926 it was turned over to private operators. Western Air Express, a TWA predecessor airline, was awarded the mail route between Los Angeles, Las Vegas, and Salt Lake City. Messages between the three cities were carried out by radio, using the CW system of Morse Code (the old dot and dash key). Once in the air, however, pilots were without communications.

By 1928, passengers were considered important along with carrying the mail. Multi-engine planes, modern airports and airways were entering the planning, production and construction stage. It also marked the start of the race for the transcontinental market (and possible mail contracts). Of paramount importance for the safe and efficient operation, two-way radio contact with the pilots was a necessity. Herbert Hoover, Jr., head of WAE's communications department, and a recognized leader in his field, was in charge of setting up the company's network of 16 radio stations and equipment aboard the planes.

For over a year, starting in mid-1928, another of TWA's predecessor companies was in the construction stage, as Transcontinental Air Transport (TAT) prepared for its 48-hour coast-to-coast service. Charles Lindbergh headed the technical committee, E. W. Proctor was in charge of communications. From the original $5 million budget to set up the airline (including $500,000 for 10 Ford tri-motor planes), $169,000 was allotted for the radio network. TAT erected seven of its own radio stations; another four were built in cooperation with the U.S. Department of Commerce. The installations, which included a radio shack and two 128-foot towers for the antennae, were (for reasons of aircraft safety) located a minimum distance of half a mile from the airport.

Cumbersome Equipment

WAE inaugurated service to the east in June 1929, TAT in July. WAE had chosen a low frequency type radio, TAT a high frequency. They had equal advantages so far as range, but TAT's airborne equipment was bulky and cumbersome. For the pilots to transmit, it was necessary to unreel a trailing antennae with a three-pound "fish" (weight) in tow. It was not usable on the ground, although more than one embar-

(Continued on Page 29)

ARINC's Network of 300 VHF Radio Stations Cover the United States

(Continued from Page 28)

ARINC...

rassed pilot landed and had neglected to rewind the dangerous missile. After two months, TAT changed to the low-frequency type radio.

This situation was typical of the fledgling airlines in 1929. There was a scramble for radio licenses and frequencies, unnecessary duplication, high costs for development, and no standardization. The Federal Radio Commission (today's FCC) took charge.

At first a series of conferences between the military and private industry were held to work out an acceptable plan for radio licensing and frequency utilization. These conferences brought out the need for a central organization to act as the liaison between government and civil aviation operators. By pooling their resources, better and more rapid progress in the field of communications would be possible, and at lower cost.

The airlines decided to form their own company, Aeronautical Radio Inc. ARINC was incorporated in Delaware on Dec. 2, 1929. Ownership would be limited to a maximum 20% by any one airline. TWA, with 10%, is one of the majority stockholders today. Although ARINC was to be a business enterprise, operations were to be on a non-profit basis, with all costs shared by the members on a pro-rated basis according to use. Services, at cost, would be available to other interested parties.

ARINC is led by a 14-member board of directors, selected from leaders of the parent companies. Two TWA presidents, Jack Frye and Richard Robbins served on the ARINC board. Other names familiar to TWAers who have been members of the board include: Paul Richter, J.C. Franklin, W.P. Scruggs, H.K. Morgan, G.A. O'Reilly (president of ARINC 1949-1951), R.C. Ayres, Paul Goldsborough, Thomas Taylor, and Bill Meador. Floyd M. Wilkerson, vice president-computer and communications services, is currently on the board.

The Radio Operator

October 1930 saw a new airline take to the air — Transcontinental & Western Air, the product of a merged TAT and WAE. Along with the new airline came a voice in the sky that was to become familiar to thousands of TWA flight crews for the next three decades — the radio operator. In the early years, his was a lonely vigil of monitoring the "Marconi" for an occasional aircraft position report or request for a weather observation (often a spot report on the conditions outside the radio shack). Morse code and teletype were used to convey messages within the company.

The HF (high frequency) bands used for air/ground communications had several disadvantages, which were more evident when the pilot needed his radio the most, during bad weather. Static, caused by moisture or other atmospheric disturbances, would make voice reception garbled or unreadable.

There was also the "skip" phenomenon where signals are erratic or fade out during the first 200 or 300 miles, although they may be heard with good intensity at distances of 1,000 miles or more. To help combat the "skip" effect, separate frequencies were used during daylight or night hours, as well as separate frequencies for operating in the western, central, and eastern regions.

During most of the 30's there was no airway traffic control, just an occasional advisory of a known aircraft's position. A few airport control towers were equipped with radios and would regulate the flow of outbound flights during instrument conditions, with a 15 to 20-minute delay between aircraft departing the same direction of flight. Once in the air, and into the clouds, the TWA radio was the *only* source of radio contact for traffic advisory and weather reports. Upon approach to landing, and the airport in sight, the pilot would again contact the tower (if the airport happened to have a radio) for landing instructions.

In 1936 the first air-CAA traffic control centers at Newark, Chicago, and Cleveland were in the construction stage. ARINC provided technical assistance. TWA radio, however, still provided the means of communication between the centers and aircraft enroute.

The year 1937 saw a major milestone in the history of ARINC. As a result of numerous hearings before the FCC, a monopoly held by AT&T was broken; they would have to lease wire circuits to ARINC for use by its members. With ARINC's guidance, the TWA communication system would expand and modernize to keep up with its expanding fleet of DC-2s, DC-3s, and Boeing Stratoliners.

The war years, 1941-1945, saw the U.S. airlines mobilized for the all-out effort. TWA was also, for the first time, involved with intercontinental flying (the ICD Operation, under military contract) and the need for radio contacts that would stretch across the ocean. The ICD experience paved the way for TWA's entry into the international market following the war. For several years, a radio operator was part of the flight crew on overseas flights.

The post-war years saw a gradual shift on domestic operations from HF to VHF as the primary radio for air/ground contacts. VHF, although limited in range compared to HF, has the advantage of sharp, static free reception that became increasingly important. ARINC, in cooperation with the CAA (the FAA today) was busy setting up its own network of radio stations, and assisted the CAA with their networks, so that the fast moving jets would always be "in range" for direct contacts. By late 1959, as TWA entered the jet age, all radio communications (except the local ramp radios) were handled by ARINC operators.

ARINC, like the airlines that it represents, has grown from the pioneer era of the 20's to become the largest private communications network in the world. The 1978 operating costs and billings amounted to nearly $93 million (TWA's share, some $5 million) for their various services. A staff of 175 engineers, technicians, and scientists mans the company's main complex (including a subsidiary, ARINC Research Corp.) of laboratories and data processing facilities located at Annapolis, Md. Another 350 employees — radio and switch-center operators, technicians, and supervisory personnel — man the various centers.

The backbone of ARINC services is the Private Line Intercity Network (PLIN). TWA has 929 voice circuits totalling 2,939,316 unit miles (244,943 miles) and 30 teletype circuits totalling 86,978 unit miles (14,496 miles). These circuits cost TWA approximately $2 million a year. The Electronic Switching System (ESS), which handles near 12 million messages for TWA, costs about $150,000. Radio contacts that are handled by ARINC operators cost an additional $1 million.

The network of PLIN and ESS makes available to the airline industry a nationwide system of leased private-line telephone, teletypewriter, and data circuitry. This is an interchange of reservation information, confirmation of seat requests, etc., that is readily available through use of office computers. This also made possible the consolidation of reservation centers at principal localities, with calls from remote locations handled directly. TWA reservations can also confirm hotel space and car rental information if the companies are subscribers to ARINC services.

ARINC, by direct wire contact with the National Weather Service, provides TWA flight operations with all of the hourly weather reports throughout the nation. The data is printed on TWA computers for flight crews and dispatch at the rate of 3,000 words per minute. Wind forecasts from the National Meteorological Center, at Suitland, Md., are fed into TWA computers in operations offices. The dispatcher controlling the flight has only to feed the computer such information as type of plane, departure and arrival point, expected payload and departure fuel, and alternate when needed.

The computer does the rest. By searching for the most favorable winds and temperatures, and considering the weight of the plane as it burns off fuel, a complete flight plan will be printed in a matter of minutes, mapping the most economical (and usually the fastest) route to operate the flight.

The flight plan, which is also used for an enroute logsheet for the crew, will contain a complete read-out of checkpoints and mileages, airway designations, suggested altitude, tropopause height, forecast ground speed and drift angle for each leg, the fuel remaining, segment and total elapsed time. Alternate routes for flight plans can be selected to avoid severe weather or turbulence.

All of these services, and others, have been developed by ARINC to provide communications support of the safe and efficient operation of air transportation.

TAT's teletype system was divided into three circuits: Columbus to Waynoka, Waynoka to Clovis, Clovis to Glendale. Sending a message from Columbus to Glendale required relaying by operators at Waynoka and Clovis. By the late 1930's (right) air-ground communications had improved.

Seniors

Patrick Hartnett, SNN, November 1 (26)
Michael B. Manton, SNN, November 1 (33)
William Leonard, SNN, November 1 (24)
John P. Goodisson, SNN, November 1 (25)
Charles Fox, SNN, November 1 (22)
Liam Boyd, DUB, November 16 (33)
Philip Carney, SNN, Novemner 1 (33)
Mary Hempenstall, SNN, November 1 (28)
Margaret Foley, SNN, November 1 (29)
Arthur Martin, SNN, November 1 (33)
William Fielding, SNN, November 1 (33)
Daniel Hefferman, SNN, November 1 (30)
Patrick Quinn, SNN, November 1 (31)
Martin O'Herlihy, SNN, November 1 (33)
Michael A. Walshe, SNN, November 16 (33)
John M. Scott, MCI, Jan. 1 (37)
William W. Webb, MCI, Jan. 1 (36)
Clarence H. Harrison, PHL, Jan. 1 (37)
Carola Ciro, ROM, Jan. 1 (31)
George A. Thompson, MCI, Jan. 1 (34)
William A. Shibley, MCI, Jan. 1 (24)
Irving Sandick, JFK, Jan. 1 (26)
Wendell A. Reynolds, MCI, Jan. 1 (37)
David A. Audelo, MCI, Jan. 1 (27)
Fred H. Fischer, EWR, Jan. 1 (40)
Francis G. Schmelzle, MCI, Jan. 1 (13)
James B. Morrow, MKC, Jan. 1 (39)
Walter L. Czirr, MCI, Jan. 1 (28)
Margaret Zammar, MKC, Jan. 1 (36)

Keeping  'em Flying'

COLLECTIBLES- MEMORABILIA

By- Don Thomas

WHO COLLECTS OLD AIRLINE BAGGAGE LABELS AND STEAMSHIP POSTCARDS AND STICKERS?

The hobby is somewhat allied to aerophilately, and collectors of first flight and other stamped covers often use these labels to dress up their philatelic exhibits. As President of the Aeronautica & Air Label Collectors Club of the Jack Knight Collectors Club Federation and Aerophilatelic Federation of the Americas, I have taken charge of producing a complete catalog of these colorful airline baggage labels of the world. Have almost completed the German section and will soon start on the U.S. airlines. Please look thru your old scrapbooks and other memorabilia and locate any airline baggage labels of the 1920s especially. If different, I would like to photograph them for the catalog, then will return to owner, or buy or exchange them if desired. Some of the labels of pioneer airlines like NAT, Stout, Boeing, SAFE, TAT-Maddux, NYRBA, Aeromarine, Atlantic Coast Airways, PanAm, West Indian Aerial Express, Western Air Express, Embry-Riddle, Colonial and many others come in various colors and designs, and one can hardly say that all varieties are known to date. Many thousands were printed and used, but few were saved. I have thousands of labels from most airlines and countries of the world for exchange with other collectors of same. Postcards, and even old timetables, of airplanes are also very collectible - many SOWP and Airway Pioneer members must have these tucked away somewhere or just included in other postcard accumulations.

Steamship postcards also look nice in an album, especially with colorful baggage labels from the same ship or SS Line. Cunard-White Star must have had 50 different ships dating back to the middle of the last century, and postcards of the Lusitania, Titanic, etc, are interesting to own. We know most of the U.S. line ships, but they must have had a few little-known ones in the days after WWI. I have a couple cards bought in Hamburg showing the United States Lines SS Princess Matoika, and the U.S. Lines SS Hudson, both passenger ships.

Also started collecting worldwide hotel stickers on a round-world trip on the President Polk in 1929 when I got my first pretty one at the Royal Hawaiian Hotel at Waikiki in Honolulu. Young Stanley Dollar was aboard that trip with his father and got interested in collecting hotel labels but found an easier way. He just told his father what he wanted, his father told the Dollar Line agents in Hong Kong, Shanghai, etc, they sent their runners out to the different hotels, and young Stanley got a big box full of labels from every hotel in the area, which he shared with me.

Some people collect beer coasters - Germany had a lot of nice ones, also wine bottles or their labels, match covers, etc. Some oprs collected cards from the different bars in places like the Reeperbahn and Grosse Freiheit in Hamburg, with gems like "Who got now the Coney Island Bar? Tilly and Sister", etc. Too bad most of us were too busy with wine, women and song to bother about collecting such souvenirs, altho I remember an opr from another ship at our dock in Hamburg, who, returning to his ship by the harbor ferry insisted on taking along a small oil drum he picked up on the pier. I went aboard next day and found him in bed with it, still asleep. Must have had too many beers - we started out at the Alster-Pavilion, a luxurious place where the beer was tall and expensive and you could pick out any classical piece on a big program for the orchestra to play. (We planned to drink only one beer in each place in Hamburg, but I guess there were too many places). At 5AM we ended up at the Last Chance Bar on the waterfront, where you tipped up the table so the empty mugs would slide off onto the floor, to get the waitress' attention. You never knew by that time who was paying for the drinks as you were broke, but the waitress just added the broken glass onto somebody's bill. Is the Reeperbahn still like that??

ADDRESS
W. Donald Thomas - - 1340-SGP
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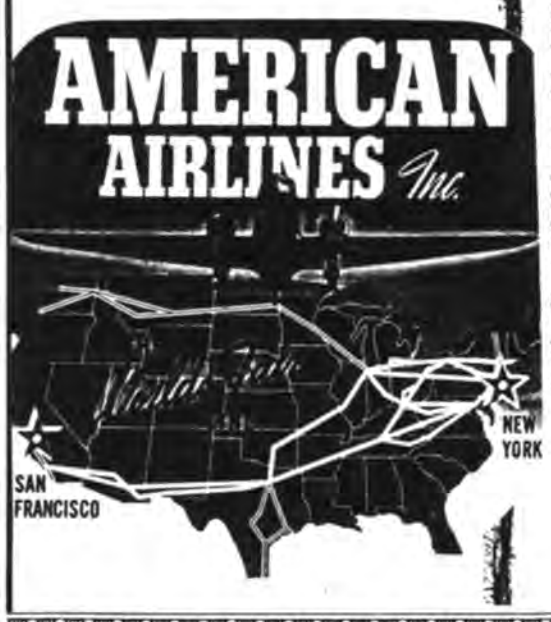
Florida - 33528



CW - Point-to-Point - Western Air Express (WAE)

By W.S. Skeen 2343-P

Although PanAm's CW operations went way back to at least the early 30's, there was a less well known chapter of airline CW operations involving the point-to-point CW ground circuits. These were, for the most part, set up in the late 30's to handle the ever-growing volume of reservations traffic. By the end of WWII, teletype had taken over, so their history was brief. They did handle a prodigious amount of traffic while they flourished, however. For example, Northwest Airlines had CW positions at the larger stations where the operator did nothing else, and I am told that American Airlines had several CW positions at larger stations.

Western Air Express (WAE - now Western Airlines) had CW stations at Burbank, California; Las Vegas, Nevada; Salt Lake City, Utah; and at Butte, Montana. Great Falls, Montana was later included in the circuit.

I was hired on at KGTY, Butte about a year prior to WWII. I was a green kid hailing from a narrow-gauge airline out in Wyoming. I found the pace considerably faster with WAE. Although most airlines used fan-fold message blanks, WAE had several types for different class messages, some with one carbon, some with two. The only warning as to what was coming was "HR CITY" or "HR SPC". Messages had a preamble with number, DT group, etc. I am unable to recall if there was a word count.

Many of the WAE operators had been to sea. I recall one, in particular, Roy Orchard who was said to have been CHOP on the Lurline. Roy, OD, was not disposed to dawdle with a green opr. After a few BKS for fills, OD would tell me to go over on "phone", the ultimate insult.

Although the radio-telephone Xmtrs were Western Electric, with a good-sized bottle in the final, the CW Xmtrs were built by WAE technicians, if I remember correctly, and put out only about 50W. Although several frequencies were available, most of the traffic was on about 6 MHz.

Although it was not unusual to rack up a hundred numbers in both the Rcvd & Sent columns, even at a small station like Butte, pounding brass was only part of the work. Just prior to touchdown, we donned coveralls, grabbed a handset and ran up two flights of stairs to the tower to meet our opposite numbers from NWA, where we exchanged position information on our respective, connecting flights. No CAA tower at Butte!

Immediately after touch-down, we dashed down to the ramp, wheeled up the steps, unloaded mail, express & baggage, worked up the forms for same, worked out the weight & balance sheet, loaded cargo, and waved them off - all within ten minutes. It was only 60 miles, or a half-hour to Helena, Montana, so within ten minutes of departure, we had to have a load message, detailing every passenger with destination and every piece of mail, baggage & express with weight, on the air for northbound flights.

I have never worked harder nor enjoyed myself more than at KGTY. There were compensations. With the airline headquarters at Burbank, near Hollywood, many of the stewardesses looked as if they might have "moonlighted" in films. Even though they had to be RNs in those days, some of these gals were really "lookers". They would sit on the ticket counter and cross their legs for an admiring audience.

I am indebted to Gene Violino, W6INH, 910-P for the following additional details. (GV and I worked each other from Butte to Salt Lake on CW, and have run across each other on 40CW.) Although WAE operated the old Boeing 247D from Salt Lake to Lethbridge, Alta, DC-3 planes were operated on the Southern routes. Some planes were "sleepers" with fold-down bunks ala Pullman. These were exchanged with UAL at Salt Lake, to avoid waking up passengers to change planes. GV also worked at Vegas when TWA was operating into a nearby field, and was on duty when their plane with Carol Lombard aboard crashed.

MSAT

WHAT IT IS

MSAT stands for Mobile SATellite, a proposed communications system that would provide more effective and reliable two-way radio and radio telephone services to all parats of Canada, without restriction on distance. MSAT would be used for communications by those travelling on foot, by land vehicle, airplane or ship, supplementing today's short-range mobile communications services.

MSAT is another step for Canada in advancing its leadership in the field of satellite communications. While most satellite ground terminals today require relatively large, expensive dish antennas, one MSAT could serve thousands of small mobile terminals similar to those used in taxis or in the cockpit of a plane. MSAT would provide mobile communications to areas now unserved at a cost to the user comparable to mobile radio or mobile telephone rates in the major cities. Such services would be particularly useful in Canada, where the population is scattered over an enormous area.

The Government of Canada has conducted a great deal of research into the feasibility of MSAT. If a decision to go ahead is made, Canada would be the first country in the world with a domestic mobile satellite communications system.

TYPES OF MOBILE COMMUNICATIONS

There are three types of mobile communications in operation today. All are limited to an effective range of about 80 kilometres from a base station.

Mobile Telephone. This is a system of two-way radio telephones linked to the telephone networks. For example, the occupant of a car with a mobile telephone can speak to anyone in the local dialing area or call long distance, provided the vehicle stays within the mobile telephone coverage area.

Radio Mobile. This enables the occupant of a vehicle to speak with a specific base station. About 85 per cent of today's mobile communications are of this type. There are thousands of independent networks owned by industry or by government for their own use. The police are among the largest users. Radio mobile service is also used for ambulance services, winter road maintenance, forest fire fighting and service trucks operated by repair companies.

Mobile Data Display. This relatively new system is used by many police forces and increasingly by taxi companies. The occupant of a moving vehicle cal all up directly, on a video display, information from a computer, without intermediary such as a dispatcher. A policeman on patrol, for example, checks a vehicle's ownership without having to speak to anyone at headquarters.

MSAT would allow all three types of communications to be extended to all parts of Canada without restriction on distance. It could also offer new features such as confidential communications and automatic vehicle location and identification.

TYPICAL USES OF MSAT

If a mobile communications satellite system were in place, it could meet a number of needs, for example:

An industrial sales representative travelling in a remote area in a car equipped for voice and digital communications could check out the availability of equipment through a data bank, then place an urgent order for delivery to the nearest airport within hours, instead of the days or weeks which would normally be needed. It would also be simple for the sales representative to get price lists and delivery data for equipment -- updated each day -- for presentation to a customer in the next town.

A commercial pilot operating in what would otherwise be poor radio conditions in the far north could talk to other pilots and a base station bout a suspected disaster. With a mobile satellite, such communications could save lives through immediate rescue operations or avoid unnecessary air missions if the concern proved unfounded.

(Continued on Page 38)

Flight Radioman World War II

By—Edwin L. Spight 3677 - V

As an historical note of introduction early in 1942 Consolidated-Vultee Aircraft Co. San Diego found it necessary to dispatch a 24A to bring ferrying crews back from Honolulu and Australia. These ferrying crews had become stranded with the outbreak of the war and were desperately needed to fly much sought after material of war as well as personnel to the South Pacific. Before this time such duties were fulfilled by the China Clipper. However, it was slow and its cargo carrying capacity was too small. When the 24A was able to outperform the Clipper it ushered in a new era of trans-ocean transportation. It, also, gave birth to the Consairway division. In 1943 one San Francisco newspaper printed an article about the 'unknown airline' which was then flying from Fairfield Suisun Army Airbase. A base that is now called Travis.

Flying trans-Pacific required five man crews. Pilot, Co-pilot, Navigator, Radioman, and Engineer. Thus the demand for trained radio operators became acute. Although I didn't realize it at the time, my training in "Ham Radio, Commercial operating in the tuna fleet as well as operating on the S.S. Point San Pablo, the S.S. Virginian, and point to point for PanAm were all necessary to prepare me as a flight radio operator with Consairway. Once I had checked out on the equipment aboard the PBY flying boats at the factory, I was assigned to the Flight and Service division at the plant in San Diego.

Delivering PBYs across the desert to Fort Worth, Texas didn't seem to be my "cup of tea'. When it was announced there were openings in the Consairway division flying "War Weary" factory rebuilt LB-30's, C87's and B24A's to Australia, I decided to toss my hat in the ring.

The value of my earlier training became readily apparent when I heard the requirements. The one requirement which separated the men from the boys was a 30WPM code test. Even though I had some second thoughts, I decided to give it a try. I was, indeed, fortunate the Chief Radio Op, Wm. E. Cunningham, had one of the world's best 'fists'. Copying his 30WPM was like falling off a log.

Before long, I was winging westward on the first of my thirty transPacific flights. It was a night flight from Hamilton field near San Francisco. When we were still about two hours flying time from Hickam field we ran through an electrical storm. It was my first experience and a scary one. The pilot was snoozing while the co-pilot twisted the knobs on the auto-

Amberley Field, Australia and living quarters for Consairway personnel.

pilot. I looked out and saw St. Elmo's fire around the tips of the props as well as along the trailing edge of the wing.

About this time the navigator nudged me with our latest position report. I flipped on the transmitter and dutifully called the ground station at Honolulu, I believe its call sign was KVM. When my report was QSL'd, I put the 'cans' on the operating desk and glued my eyes against the window in fascination. Now the St. Elmo's fire was coming up in great billows from the hull of the plane.

Apparently, this was a new experience for the co-pilot. He shook the slumbering pilot who awakened with a start. Nature had been patiently waiting for this opportunity to display her best wares. With a resounding crash and a blinding flash, we were struck by lightning. The pilot tried, without success, to focus his eyes. Nothing happened! Panic stricken, he reached into his flight bag for his flash light to try to see the instrument panel. He couldn't see the flashlight's beam. He was blind as a bat!

Mother nature took compassion on our pilot as his blindness proved temporary. Slowly his sight returned. Two hours later when we landed at Hickam we did a careful inspection of the entire plane. Back near the tail we found a spot about the size of a silver dollar (Pre-War) with numerous small holes where the lightning had actually struck us. Thoughts dwelled in our minds about what would have happened had we been transferring fuel at that precise moment.

Many of our flights were just 'routine' if anything as hairy as flying across the Pacific in land based, unarmed planes with nothing more than a Verry pistol and an inflatable life raft for life support systems could be classed as 'routine'.

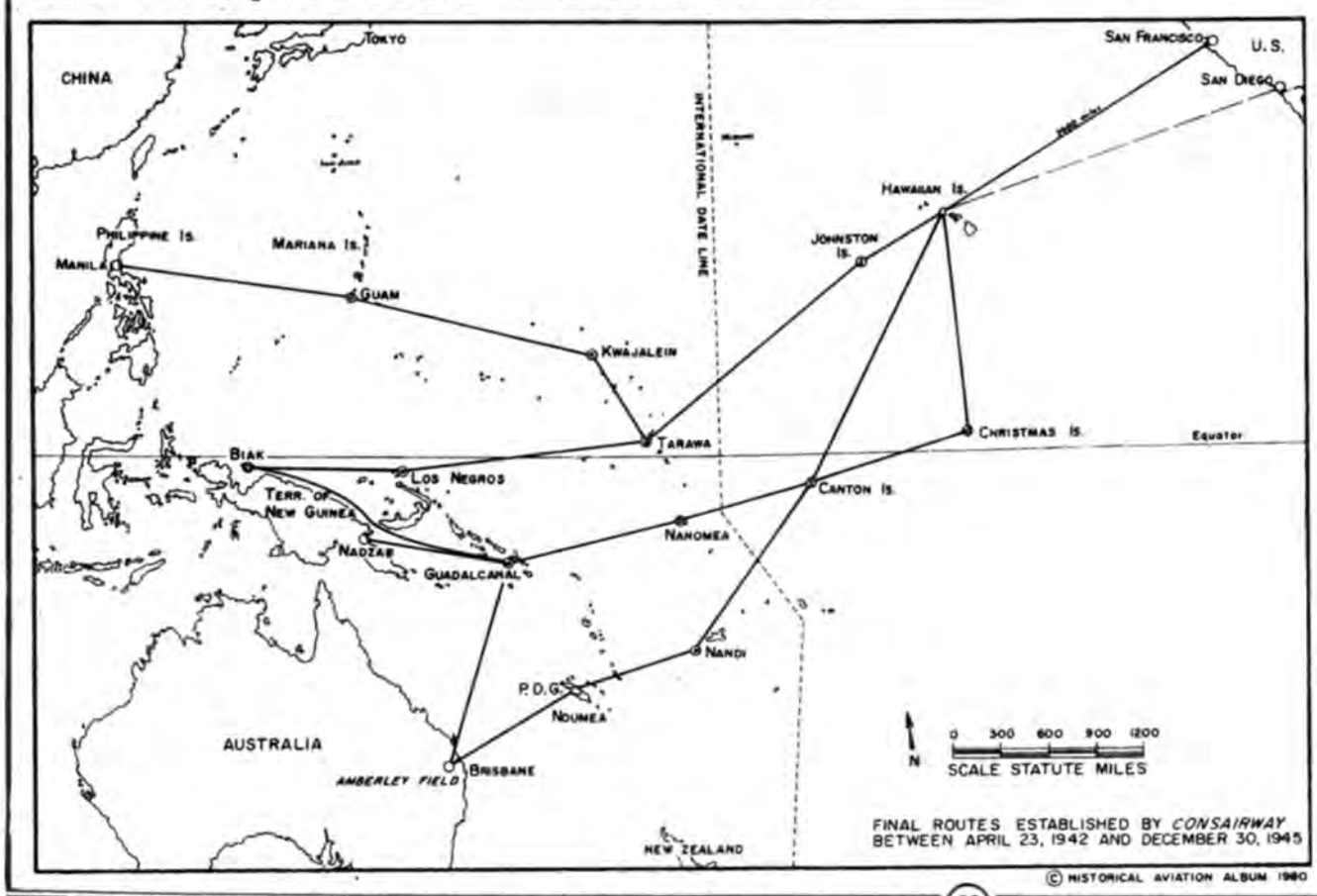
(Continued on Page 33)

During World War II, Consolidated-Vultee Aircraft Corp. of San Diego, Calif. formed a separate company, a transport division called Consolidated Airways, Inc . . . contracted to Consairways. A government contract was awarded the firm to assist the military Air Transport Command in flying high priority personnel and material to far distant theaters of war in the Pacific.

The author was a radioman with Consairways throughout the war and not only relates first hand experiences of those dangerous and uncertain flying years but also has collected the reminiscences of many of his fellow crewmen. This is not a historical narrative but rather a very personal, human glimpse into a colorful group of aviation pioneers.

Consairways is little known because of the veil of secrecy with which they operated during the war. At first their job was to flight deliver aircraft to Allied nations in the Far East. Later, as the airline became better established they flew every type of cargo imaginable from toilet paper to torpedoes and passengers from privates to Prime Ministers. These men and their reconditioned machines flew in some of the worst weather conditions the Pacific hurricanes could produce, before the days when aircraft were capable of flying over such destructive forces. They flew with primative communications, questionable navigational aids and limited propeller power, hoping the old bucket of bolts would hold together. And yet the crews considered all this routine.

These were pioneers in Pacific ocean flying. They made the unusual and impossible - practical. Their experiences are now legendary. They were professionals in every sense of the word.



(Continued from Page 32)

Consairways...

Memoirs of an Air Transport service during World War II

On one memorable flight we saw them load long boxes aboard. Each was nearly the length of the cargo compartment while the end was approximately 4" X 6". Curiosity nearly killed all us cats when we were informed we couldn't read the cargo manifest until we were in the air. What really capped the climax was when we observed a lone WAC officer who was to be our sole passenger. All thoughts of introducing her to the 'Mile High Club" fled when we observed her to be sporting a nasty looking .45. A determined look on her face gave us to realize she meant business. She was the 'armed guard' who was to accompany us and protect our cargo. Just what the hell were we flying?

Tent living on Guadalcanal was stylish compared to earlier ground level tents used during early years of the war.

Once we gained our altitude our Captain, Ott Gardner, slit the seal on the manifest. A bewildered look crossed his face. Slowly, he emitted a low whistle as he motioned us to his position. We heard him say, incredulously, "Fellas, have you any idea what we're hauling?" Dutifully, each of us answered in the negative. At last he let each of us share the secret. Our eyes bugged in disbelief but there it was in black and white. We were escorting $125,000,000 in cold cash! The government had been kind enough to provide us with a gorgeous dame to help us spend the loot. All we had to do was figure out a way. I suppose the only way to end this story is to say we're still poor but honest, Damned it! P.S. It was invasion currency for the invasion of the Phillipines-we couldn't have spent a dime outside of the Phillipines.

No flying adventure would ever be complete without detailing a few of those 'hairy' stories which added spice to our lives. On one occasion we had reached our Western terminus at Biak Island off the western tip of New Guinea. It was hot, humid, wet and miserable. Only recently we had lost a fellow crew member and friend there in a Jap bombing attack. When we were informed our flight was ready, it was none too soon to suit us. En masse, we made our way to the operations hut where we were briefed on our flight route. Then we consulted the weather oracle who anticipated some shower activity but not much else. Confidently, we boarded the plane and gave it the usual pre-flight check. When everything seemed in order we got clearance from the tower and were soon on our way up the coast of New Guinea toward the 'slot'. However, Mother Nature had other plans for us. Shortly after I had sent in our first position report we ran into the most Gawd awful excuse for a tropical hurricane you have ever seen or will ever see. Both pilots grabbed the wheels and hung on for dear life while we started the most violent roller coaster ride I've ever been on. We experienced down drafts and up drafts which would easily have torn the wings from a smaller plane. I looked at the radio compass as it swung uselessly in lazy circles. The radio was just a mass of rain static making communications impossible.

Propaganda leaflet by Allied airmen told enemy he was abandoned on islands by Emperor and no new supplies would reach him.

For five and a half hours we bounced while we wondered when we would be picking the mountains of New Guinea from our teeth. We could only trust to God and our navigator as we plowed through the muck. Finally, we broke out and were amazed to see lights below us. Slowly, a sick feeling of sheer horror passed over us as we slowly realized we were directly over Wewak, New Guinea, a large Jap base! Hastily, we scudded back into the protecting cover of the friendly clouds as we corrected our course for Guadalcanal!

The famous Moana Hotel in Honolulu 1945 ... remembered by thousands of American servicemen.

EAGLES of the PACIFIC

By Edwin L. and Jeanne L. Spight

During the early months of America's involvement in World War II, it became painfully apparent that the military Air Transport Command could not fly all the high priority personnel and material needed in far distant outposts and war zones in the minimum amount of time required. The logistics were staggering in such a global war, particularly in the vast Pacific Ocean area. Accordingly, contracts were let to civil or independent private firms to bolster the military's burden. Two such contracts were awarded, one to Pan American Airways and one to the Consolidated-Vultee Aircraft Corp. of San Diego, Calif. The Consolidated firm used aircraft of their own manufacture and an air transport division was established as Consairways, a contraction of Consolidated Airways Corp.

The Aircraft employed were Consolidated LB-30 and B-24 bombers or C-87 cargo versions of the bomber. Because of the heavy military demand on production of these machines, Consairway was forced to use converted and reconditioned, war-weary models brought in from all corners of the globe. Thus most of their aircraft were ex- and had a long and varied flight history before becoming Consairway transports.

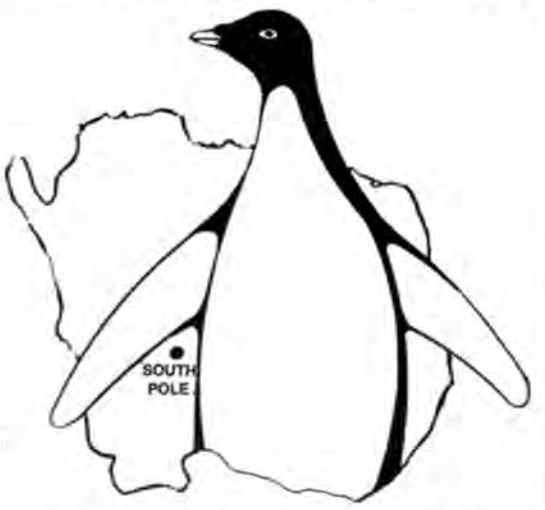
Consairway started formal operations on April 23, 1942, establishing the plant and Lindberg Field in San Diego as home base. On December 15, 1943, the Airways operations were moved to Fairfield, Calif. in the northern part of the state. Most of the personnel lived in nearby Waterman Park in the Napa Valley area and flight operations were conducted from the newly established Fairfield-Suisan Army Air Field. The entire complex was just inland of San Francisco.

Regular flights and schedules were maintained throughout the war . . . many times under the most adverse of conditions. Consairway was so successful that serious discussions were undertaken to make it a permanent scheduled trans-Pacific airline after the war. These negotiations never materialized due to "outside" influences and the company did not want to get into the airline business. Consairway remained a war time effort only. The termination of hostilities cancelled the Consolidated contract late in 1945.

It is not so much the machines, but the personnel behind this organization that have stories to tell . . . experiences of joy, of difficulties, of hardships and of sadness. The authors relate some of these memoirs in this book.

EDITOR'S NOTE: We reviewed "EAGLES OF THE PACIFIC" written by our member Edwin L. Spight (with aid of XYL Jeanne) in 1980. It was reviewed on Page 39 Sparks Journal "Hall of Fame" issue 5/2. Ed's SOWP Serial is 3677-V and ham call W6XR. QTH: 8542 Florence Ave.(A) Downey, CA. 90240. Tab is $13.95 ppd (+ 6% tax in CA). A very interesting book on South Pacific activities during WW-II. W.A.B.

First Byrd Antarctic Expedition -1928-30



BY

Howard F. Mason

When I went to New York in September 1928 and went to the offices of the New York Times, I was told of the plans.

Richard E. Byrd, who was then a Navy commander, had flown over the north pole in 1926. His ambition was to also be the first man to fly over the south pole.

Today I will tell mostly about communications. For the full story of the expedition I refer you to Byrd's book, "Little America" published by G. P. Putnam's Sons Co., in 1930. There was intense public interest. The expedition was financed mostly by public subscription.

There would be a 42-man base called "Little America" established on the edge of the Ross Sea ice shelf (sometimes called the "ice barrier") some 750 miles from the south pole and 2300 miles south of New Zealand. The opportunity would not be passed up to explore extensively using dog teams and additional aircraft flights. There would be research done in several sciences. The entire expedition would be away from New York for about 18 months.

The two ships would take the winter party to the Ross Sea base and after unloading, return to New Zealand for the winter to escape the pack ice. One ship would go south and pick up the entire expedition the the next summer, and return to the states. The Ross Sea is accessible only in the fall, yet the best flying weather is in the spring.

One ship was to be the old, wooden barque rigged ship "Samson" 167 feet long, renamed the "City of New York". The other was the small steel steamer "Chatham" renamed "Eleanor Bolling" after Byrd's mother. It had a forward hatch large enough to take the huge crate enclosing the fuselage of the tri-motored Ford aircraft, which was scheduled to make the pole flight.

Besides the 42 men and the 80 dogs, the ships must carry food, fuel, dog food, photo and scientific gear, and a thousand other items, it seemed. And don't forget the radio equipment and take plenty of snow shovels.

The New York Times had made a rather large monetary contribution and was awarded exclusive news rights. They would also furnish all radio communication equipment and operators. The Times would furnish a reporter as a member of the expedition who would send back daily reports direct to the Times in New York for publication in papers of the North American Newspaper Alliance thruout the country and the world.

This sounded like a pretty large order.

Short waves had only been in use for a few years. Not too much was known about their reliability over long distances, especially on rather low power. The distance from New York to Little America is about 8900 miles.

For several years the Times had operated a transmitter on the 14th floor of their building in mid-Manhattan, with the call letters WHD sending daily press schedules to ships at sea. Reports received indicated that they were getting pretty fair coverage over a considerable part of the globe.

Based on this, it was thought that if the base had a transmitter similar to that at WHD that comparable results should be obtained. So three transmitters were built, for the base and the ships. Shop space was loaned by the Lighthouse Service Shops on Staten Island. For each a maple frame was built, supporting a smaller frame to carry two UV-204A one-quarter kilowatt tubes, to be operated as self oscillators in a tuned grid-tuned plate circuit, self rectified. Malcolm Hanson, the expedition radio engineer, sent up copper strip coils, blocking condensers, and other parts from Washington. These were appropriately mounted. Plate supply would be furnished by a one-kilowatt Crocker-Wheeler 500 cycle a-c motor generator obtained from a surplus store on the East Side. Transmitters like this have a good note that cuts through interference and carries well, though illegal now. Primary station power would be from one or the other of two standard Kohler 2 kw. farm lighting plants for the base transmitter.

RCA installed converted P-8 transmitters on each of the two ships for 600 meter use. A 500-watt Bureau of Lighthouses beacon transmitter was taken along so we could rig a four-course A/N beacon at the base, should the weather close in on the pole flight as the aircraft returned from the pole. It was not needed, however. This transmitter normally was set up on 600 meters.

The short wave receivers for the base and for the two ships were Gen. Elec. AR-1496B using low drain tubes and plug-in coils in a four tube configuration. For medium and long waves the Navy loaned low serial numbers of a new type of receiver. Both ships carried the old large type Kolster direction finder. The City of New York carried a depth finder for deep ocean depths.

While at Staten Island we obtained and partly assembled parts for three light weight sets to be used on the trail. They would be completed and tested in the Antarctic during the winter when there was more time. The transmitters used one 7.5 watt tube crystal oscillator, keyed directly into the antenna and powered by an English Evershed hand generator furnishing both filament and plate power. The receivers used four tubes in an r-f, detector and 2 audio configuration, operating entirely from dry batteries. Burgess supplied what seemed like a ton of batteries.

After a hectic last few days in New York the ships left; the City of New York left a few days ahead of the Bolling because she was slower. It was a gala send-off with banners and bands, whistles and bells, and many escort boats of all sizes. As she left the harbor the SS Leviathan was coming in and gave her three toots'.

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Antarctica—'Bottom of the World'

I left on the Bolling a few days later, bound for Norfolk to take on coal. We almost immediately tangled with the tail end of a hurricane, were blown off course and nearly ran aground off Cape Hatteras. On to Panama and things quieted down and became routine. Copied time tick, weather, and press, handled a few messages and sent a daily position report, that was about all. We were supposed to meet the City of New York at Tahiti, but the City hit the doldrums and was 42 days from Panama to Tahiti.

But that was not all. Out in the Pacific WHD started to have difficulty in reading the ships due to the high level of man-made interference in mid-town Manhattan. This caused considerable concern as it would jeopardize the whole communication plan.

Mr. Iverson, the Times chief operator, put a receiver in his car and went way out on Long Island and searched until he found a place relatively free of any interference. There he put up a shack and installed a receiver and a special type of long wire antenna, directional south. Two telephone lines were leased to the Times office, one for a signal line, the other for an order line. This completely remedied the problem and receiving was through this remote station for the rest of the time it was needed.

The remainder of the trip to Dunedin, New Zealand was made without incident except that I learned what the Times meant by "exclusive news rights". One day I was working an amateur and engaged in a little of what is called amongst operators "chewing the fat". I mentioned that we had a pretty strong wind, that the ship listed quite a bit as we sailed along causing quite a bit of water to come on deck. Nothing wrong with this. But he gave it to his local paper apparently, enlarging it a little, and the local editor passed it on, with further enlargements, to the Hearst News who printed it thruout the United States. The New York Times hit the ceiling the next morning when the Hearst papers came out with a story that the City of New York had encountered a terrific storm, had acquired a bad list and was taking on large quantities of water and was in a bad way. We heard from the Times the next day. Definitely nothing should be given out that can be construed as being of a newsworthy nature until the Times gets it first.

Many of the dozens of amateurs with which we worked in the months ahead may have wondered why the expedition operators never relaxed to "chew the fat" once in a while but rather put everything in message form. Reason - A message goes only to the addressee.

At Dunedin, a town in Southern New Zealand, more cargo was waiting on the dock. The ships were almost completely reloaded. Everything was checked and inventoried. Some of the personnel were shifted from one ship to the other. We sensed that the list was being made up of those who would spend the winter "on the ice". One or two men were given tickets back to the states and were told that they were unsuitable.

Leaving Dunedin, we headed south. The daily schedules were being maintained with WHD although not always 100%. Both ships were badly overloaded and sluggish in the water. Instead of rising to the waves, the waves would go over them. The City of New York was not making too good progress so an attempt was made to tow her. Soon the towline broke and a little later the large mainsail ripped from top to bottom. On the fifth day we saw our first iceberg. These large bergs over a hundred feet high break from the face of the barrier and the wind carries them northward, sailing through the ice pack, and eventually melt in warmer waters. In a few more days we reached the ice pack which lays at the entrance to the Ross Sea. The ice was pretty well broken and there was considerable open water. Fortunately it was calm so we worked through carefully. Within a day or two we reached open water and headed for the Bay of Whales.

On arrival, both ships were made fast to the bay ice and the preparations for unloading began. The dogs were unloaded and unlimbered. A small party started out with one team to find a location for our winter home. A good place was found about five miles back from the edge of the barrier in a small depression. Unloading began. All material not immediately needed at camp was placed in a barrier cache well back from the edge. As soon as material was taken from the ship it was hauled back a safe distance. Just as soon as the ships were completely unloaded and the first house was up they left for New Zealand. Daytime temperatures were running about - 20 F. at that time.

The rest of the houses were put up, then the three sixty foot steel windmill towers and antennas of several kinds. Later a Beverage wire about 800 feet long was out up, supported on bamboo poles, pointed a little East of North, towards New York. Within a few weeks the houses were almost covered completely by drifted snow.

The first house to be erected measured about 24' x 36' inside. A place about eight feet square was walled off with heavy insulating blankets as the radio room. Along the wall to the left of the entrance was the radio table, with receivers on shelves above. At the operator's left was the short wave transmitter. On the opposite wall high up was a shelf for a Kolster TRF broadcast receiver, and below that a calendar. Along the blanket wall opposite the receivers were two tiered bunks for Pete and I. Carl Peterson was a radio operator on Norwegian passenger ships and for a time was stationed at Kings Bay, Spitzbergen before becoming an American citizen. He was an excellent operator and had a fine personality. Pete and I shared equally in the operating. The remainder of this building was occupied by a large galley type coal range, workspace and table for the cook, a large dining table seating about 22 down the center, a large sink and dish shelves, two-tiered bunks sleeping about 20, a wall clock and a telephone to the other house.

The other house also 24' x 36' was put up several hundred feet from the first house and in winter, connected with a snow tunnel. This house had a room partitioned off as the commander's quarters, contained a 2000 volume library, and had space for scientific equipment and two-tiered bunks for the remainder of the 42 man crew. It was heated by a large coal burning caboose stove in the center of the building.

The 80 dogs were housed in their individual boxes, set apart in the walls of tunnels. Each team had its tunnel, radiating from a central "chopping house" where seal meat and other food was prepared. At the far end of the tunnel the sledges were kept and there was an opening to the outside. The three aircraft were dismantled partly and stowed away for the winter in large covered ditches.

At Lat. 78.35 where we were there is four months continuous daylight and four months darkness of night, with various amounts of alternate day and night in spring and fall. The lowest temperature recorded was 72 degrees below zero Fahrenheit, but the worst combination was a minus 35 degree temperature with a 70 mile wind.

Now something about radio. After trying various times of day and various frequencies we settled on the top edge of the 36 meter marine band, and found that signals usually started coming in from New York about the time darkness started to creep across the U.S. This was our afternoon due to the longitude difference. Later midwest and west coast signals could be received. The "Little America" assigned call letters were WFA. The ships were WFAT and WFBT. I don't remember the calls of the aircraft or the trail parties.

(Continued on Page 36)

ANTARCTIC—MASON

(Continued from Page 35)

The usual daily schedule was to first clear the Bolling in New Zealand in the morning several days a week. Signals were generally fair. Soon after lunch we would start calling WHD briefly at 15 minute intervals. They did the same. As soon as, and if, we heard each other we would start sending our press dispatch about 15 wpm. As soon as signals got better, if they didn't fade out, WHD would ask for faster sending. We used the Commercial Z signals instead of the Q signals as being more suitable to our type of operation. There were times when WHD asked to send as fast as we possibly could, to get as much traffic through as we could before a fadeout. Sometimes, if it were a clear night, when things started to fade we would look outside and see a beautiful Aurora starting to appear on the horizon right between us and New York. As it slowly rose the air would be completely dead until after maybe an hour it would have risen overhead and died out. Signals would be back strong, then. On another occasion the air was so completely dead for nearly two days that nothing could be heard on any frequency. It was just as if the receiver had been turned off. When we returned to the states one of the Times men told me that one day our signals were so loud that he laid the phones on the table and could read us in the next room. He would tell the others in the editorial office, "Hear that? That's Byrd in the Antarctic." On the other hand, some people don't believe you if you say you can read weak signals better if you shut your eyes, open your mouth, and hold your breath. It's true.

Our usual schedule was to send our press and expedition messages to WHD first, then receive from him before handling personal messages. After that we would shift our transmitter to the edge of the 40 meter amateur band and clear Ronne Martin at the San Francisco Examiner. (Personal messages only) Then a brief CQ and it seemed that every amateur in the U.S. answered. Several amateurs were there night after night and took many personal messages. Others would report our signals good until we tried to send a message, then it was "Sorry OM you faded". I suspect they only wanted the contact. Every expedition member who wished sent a message home and got an answer back about once every two weeks. This was genuinely appreciated. It is difficult to realize the effect on some. One fellow who had not received a message from home in a couple of months would frequently come to the radio room and ask if any message. As days went by he became progressively morose. I mentioned it to Charlie Lofgren, the Commander's secretary. "How long since he has had a message," Charlie asked me. When I told him he said "well for Pete sakes get ahold of New York and tell them to get in touch with this fellows folks and get a message out of them". When the message came it fixed everything.

Pete used to work the Norwegian whalers who had several factory ships in the Ross Sea in the summer, in Norwegian. He also contacted Kings Bay Spitzbergen

LAST 'PORT 'O CALL' N DUNEDIN ENROUTE ANTARCTICA

How the world looks southern side up

twice, his old station. On the globe, Kings Bay is just about diametrically opposite from Little America.

Some rather unusual things happened. I had been told that the Navy had all of their stations monitoring our transmissions, but I didn't think any more about it until one day, right after time tick when we held a message for the navy, I got a hunch and gave NAA a brief call. He came right back, so I gave him the message.

- - - - - - message. The next day we were notified through WHD that what we had done was "highly irregular" and should not be repeated! In the future all messages for the Navy Department should be routed thru NPU in Somoa, a station we had never heard.

On another occasion I was trying to work WHD and something seemed to be wrong at the New York end. Then the downtown operator called and "please tell the operator on Long Island to hang up his phone so I can call him." Hows that for relaying through the nearest station, 8900 miles down and 8900 miles back to send a message 40 miles.

As spring approached and the sun came back, Little America came still more to life. There was snow to shovel, looking for things that had been buried, and consolidating supplies. The dogs were freed from their tunnels and exercised. Photographers checked their cameras. Rations were weighted out and packaged for each man for the coming trail journey. The radio sets for the trail were completed and tested.

One day we heard that Sir Hubert Wilkins, who had aspirations to fly to the south pole from the South America side of the continent, had an aircraft in the air. Activity increased at Little America, although the daytime temperature was running about -40F., and the mechanics had the tri-motored Ford put together and ready to fly within a couple of weeks! Flight tests were made and a gasoline cache was laid down about 300 miles to the south for use on the return trip from the pole.

Meanwhile four dog teams left on a southern journey that would take them some thirteen hundred miles and they would be away nearly three months. They would set up their radio at the end of travel every second or third day and report their position and give an "all ok". Messages would be brief. Cranking a hand generator after travelling all day behind a dog team I imagine is not pleasant.

Meteorologists carefully watched the weather for many days until one day they announced "this is the day". The aircraft took off perfectly after a 30 second run. The transmitter was set to send a locked key signal thruout the flight, but it was interrupted about every half hour to send, by means of code words, the position and an "alls well". We listened hour after hour to the steady drone of the planes transmitter. Finally the note broke and the word "sugar" was transmitted. This meant they had reached the south Pole! After circling several times the airplane headed back. I won't say "north" because every direction is north. During part of the flight the NY Times had heard the aircraft faintly in New York. After refueling at the cache that had been laid down earlier the airplane headed for Little America. It was shortly after that Byrd was made rear admiral.

(Continued on Page 38)

THERE ARE WAVES---AND THERE ARE WAVES

By- Prof. H.J. Scott 837-SGP

Wave motion is a widely observed phenomenon and is probably the most important type of motion known to man as we shall see in our pursuit of the subject. It is wave motion which brings sound to our ears; light to our eyes; warmth and heat from our stove; entertainment from our radios and TVs; location of bodies under water by means of SONAR; location of ships, planes, etc. by RADAR; earthquakes to our cities and tidal waves to our shores. All these and others.

Wave motion may be defined as the means by which energy may be transported from one place to another without the transfer of matter between the places.

Of the many kinds of waves, each has its own system of generation and its own method of detection.

As a boy I remember standing on the beach and watching the waves roll in. One wave crested with white foam chasing the wave in front of it until they washed up on the shore and were no more.

At this tender age I didn't recognize that this apparent movement was not the real one. Had I watched a small piece of driftwood I might have noticed that under the action of the wave, it was simply lifted up, pushed forward a little way, let down and drawn back. Actually the driftwood described a circle in its course with the place of the circle in the direction the wave appeared to travel.

If we could ride on the wave in such a manner as to always remain on the crest, our speed would be the wave velocity. Then if we were to drive a stick into the bottom of the body of water and noted the number of times per second a crest passed by, this would be the frequency of the wave motion, and the distance from one wave crest to the next wave crest would be the wave length. We may say then that; "The wave velocity equals the wave frequency times the wave length. In other words,

$$v = f\lambda$$

It is easy to form a concept of wave motion such as we have just discussed when we can see it. It is much more difficult to picture the concept of waves which we cannot see.

As an example, we often hear said that water is incompressible. This is not strictly true since water is really very, very slightly compressible. So, let us apply some great pressure on some confined water. The water is then squeezed into a slightly smaller volume. Resisting this pressure it expands to its original volume as soon as the pressure is relieved. So, as a result we can have waves of compression and expansion formed in the water. These are classified as longitudinal waves since the wave motion is back and forth in the direction of propagation.

Since the propagation of waves in water of this type which is the type in which we are usually interested are for the most part in the audible range we call them acoustic or sound waves.

The velocity of acoustic waves in water is 4,707 feet per second at normal temperature. This determination was made by measurements in Lake Geneva, Switzerland, some years ago. In air the velocity of an acoustic wave is 1,090 feet per second at 0 degrees Centigrade (32 degrees Farenheit). An acoustic wave cannot be propagated in a vacuum.

I think we have all seen a flash of lightning and heard the thunder which follows. The lightning flash arrives at our eyes relatively instantly. The thunder travels approximately 1,000 feet per second so, if we count the number of seconds which elapse between the lightning and the thunder we can tell pretty well how far from us the lightning took place. For instance, if it took 5 seconds, the lightning was about one mile away (approximately).

It is the longitudinal or acoustic type of wave in water which is used in SONAR and the electronic depth sounding devices.

Seismic Seawave Travel-Time Chart
(U.S. Coast and Geodetic Survey)

In steel the velocity of sound is basically 15,500 feet per second, or roughly three miles per second. Suppose we could stretch a steel wire from here to the moon. Now let us give our end of the wire a pull. This would start a longitudinal wave travelling along the wire. This pull would not be felt on the moon for almost 22⅔ hours as it would take this long to propagate the 239,000 miles to the moon. To play a little longer with this idea let us assume we have stretched this wire from here to the sun, a distance of 92,000,000 miles. We would find that the pull applied at earth would take almost a year travelling at this 3 mile per second speed before it was felt at the sun!

Let us now look briefly at another essentially acoustic wave, the torsional wave. Suppose we give a steel wire a sudden rotational twist at one end. The velocity of the torsional wave so produced would be found to be much less than that of the longitudinal wave in the same wire.

It is now time to consider what we know as electromagnetic waves. These embrace a wide frequency spectrum and they are classified according to our use of them into different frequency ranges. Hence we have descending order of frequency:

X-rays
Ultraviolet rays
Light rays
Heat rays
Infra red rays
Radio waves on down to ultra low frequencies such as power frequencies.

These electromagnetic waves are transverse waves. By this we mean waves whose wave front is perpendicular to the direction of propagation. In the electromagnetic wave, the electric field is at right angles to the direction in which the wave travels. I am sure that by now I have succeeded in thoroughly confusing you!

To help make things a little more understandable, think of a cube in which the electric wave component is in the direction of the heighth of the cube, the magnetic wave component is in the direction of the width of the cube, then the propagation would be in the direction of of the depth of the cube. Is this better?

Electromagnetic waves are propagated at the rate of 300,000,000 meters per second or approximately 186,000 miles per second. Even at this incredible speed it takes a seemingly long time to get to some places. For instance, light which is an electromagnetic wave takes about 8⅓ minutes to get from the sun to the earth. Hence, when you see the sun disappear below the horizon at sunset it has already dropped below the horizon some 8½ minutes earlier so that what you see disappear, is the light which left the sun some 8½ minutes before.

Let us now think of tidal waves for a bit. Tidal waves basically are due to the gravitational effects of the sun and the moon on our oceans and large lakes. They are slow and seldom damaging. Wind blowing across the surface of a body of water such as the ocean produce the familiar waves we see wash up on the shore. They are usually pleasant waves. However, as in the case of a typhoon or a hurricane these waves can become quite large and destructive.

(Continued Next Page)

Continued from foregoing pages

EAL - MACHEN

(Continued from Page 19)

Norfolk (for VR-1 and Naval Air Transport Squadrons Atlantic) on a survey flight to Iceland via Goose Bay with Reserve Lieutenant commander Red Allen (American Airlines) at the helm. Believe this was early 1943 after coming down from Patrol Wing 7 and 5. Anyway - it was a period of transition with various air ground coverage - Navy - Army Air Corps - RAF - very interesting. Communications on USS Wasp was most interesting of course. But enough of personal touch - scuse please.

AIRCRAFT RADIO EQUIPMENT - For the real "skinny" on this I believe you could hit pay dirt through Howard Mehrling (SOWP) and M. R. Mickey Cochrane (SOWP) both retired from EAL. Bill Alexander, another member, could add other angles as he worked as ground operator, aircraft radio maintenance and flight radio operator.

Conclusion - All the aviation radio operators I have known have been dedicated ones; working out the problems of early aviation in many ingenious ways. They just weren't just brass pounders. It was a time of growth and all of them (commercial and service) can look back on jobs well done.

I hope the foregoing is not too confusing. I am a little under the weather and had hoped for a better organized presentation.

73s and SK

L. Machen

"MSAT"

(Continued from Page 31)

A small fishing or pleasure boat on the seacoast could be assured of instant and sure communications with other boats and a base station in case of trouble.

In short, MSAT has uses wherever people wish to communicate reliably and quickly in this country of vast distances.

THE STORY SO FAR

Civilian and military experts have been studying the idea of a mobile satellite communications system for Canada since 1972. It was a large step forward whe, in 1979, the World Administrative Radio Conference authorized the use of the 806-890 megahertz (MHz) band for mobile communications satellite services in North and South America.

The next year, the United States Natinal Aeronautics and Space Administration (NASA) began discussions with the Canadian Department of communications respecting planning and feasibility studies for a demonstration program. The two countries continue to work together in the hope that MSAT will be available not only to Canada, but for use throughout North America.

Earl work on MSAT indicated enough market potential to enure commercial success when the technology is developed. In 1980, the Government of Canada authorized 2.2 million to explore uses and to a allow technical work to continue in the planning for a demonstration mobile communications satellite.

ANTARCTIC—MASON

(Continued from Page 36)

The principal navigational instrument used was the Bumstead sun compass, which is an 8-day clock with a 24 hour dial and a thin pin about three inches long projecting upward from the center of the dial and with a compass rose also printed on the dial. In use the clock is held so the pin casts a shadow on the dial at a place corresponding to the local sun time. Directions can then be read from the compass rose.

When word reached New York that the pole flight had been successfully flown, we were swamped for many days. Congratulatory messages came from everywhere. WNN sent the bulk of them, but Ronne Martin at KUP, the SF Examiner had a stack; those filed with WU came via KPH: Fred Roebuck at Mussel Rock gave a stack to Don Harris on the of the Pres. boats in the W. Pacific; and every amateur we could hear had messages. When it was over we had received nearly 800 messages that month.

Ordinarily our monthly total was about 150, sent and received. For the whole time in the antarctic, some 22,000 words of press were sent.

In a few weeks the trail party returned. It was probably the longest dog team journey on record. There was now a wait of about two months before the ship arrived. Everything was made secure and the aircraft were well tied down facing the prevailing wind with the tails propped up and the skis well covered with snow blocks. A later expedition brought back the trimotored Ford and it is now in the Ford museum at Dearborn. The usual daily contacts with WHD continued, also with other stations.

When word was received that the City of New York was on her way to pick us up, a temporary base was built near the edge of the bay ice where the ship would tie up and most of the material was hauled there to facilitate loading.

The City of New York had several days wait before she could negotiate the pack ice. Once through, she ran into strong headwinds. So much ice was picked up forward from water and frozen spray that the bow went several feet lower in the water. This raised the stern until steering became difficult. The ship was blown about 200 miles to the west before the ice could be partly chopped off and the storm abated. She finally worked her way along the face of the barrier until the Bay of Whales was reached. We ran the last schedule from WFA.

Loading began immediately. The ship was only there 10 hours. The ice was forming on the Bay when we left. The trip back to Dunedin was made without too much difficulty and mostly with all sails up.

It was nice to see green grass and green trees and to eat green vegetables again.

Finis

WAVES

By H. J. Scott

(Continued from Page 37)

Then there is a type of so called tidal wave which is usually due to an upheavel of the ocean floor produced by earthquakes or by subterranean volcanic action. These waves can be gigantic in size and travel with great velocity. They are capable of enormous destruction and on occasion a whole coastal city can be totally destroyed.

There is a tremendous amount of power available from wave motion in water and several attempts have been made to control and use it. Other types of waves exist but are of no great interest to us in this particular discussion and so have not been mentioned here.

However, there is one rather unique type of wave that perhaps we should mention here and that is a type of wave perhaps best known to the navy. To navy personnel during WW2 these were known simply as WAVES. I think that a detailed description of these, is unnecessary here at this time.

-30-

(Continued from Page 40)

'YANKEE CLIPPER'

The crews that pioneered the Pacific routes had been trained in Latin America. The men who would fly the Atlantic were seasoned veterans of both Pan Am's Latin American and Pacific services—which meant they were the most experienced pilots in the world. Captain Mike La Porte, at the controls of the *Yankee Clipper* on May 20, had made 50 Pacific crossings—so when he told the ever-present reporters covering his departure that although he thought it was "fine to be on the first flight, this is pretty much a routine operation of the line," he wasn't putting on an act for them. He meant it. Nevertheless, the first flight of the *Yankee Clipper* did excite the general public, and a crowd was on hand to see it leave. And as he had before the *China Clipper's* inaugural flight, President Roosevelt sent his congratulations. "Pan American Airways deserves great credit for bringing about this new era in transatlantic communications," he wired.

After taking off, Captain La Porte swung the Clipper over the grounds of the World's Fair where the Aviation Building was being dedicated. He dipped a wing in salute and radioed to the dignitaries below his acknowledgment of their good wishes. "We are proceeding to Europe," were his final words to them as he headed out over the ocean.

Twenty-six hours later, after one refueling stop in the Azores, the *Yankee Clipper* put down in the harbor at Lisbon, Portugal. After an overnight stay it flew to Marseilles, France. As on other Pan Am first flights, the *Yankee Clipper* carried only mail. The first passenger flight took place the following month when 22 passengers were flown to Europe on the *Dixie Clipper*, another Boeing 314.

Pan Am was authorized to fly across the Atlantic on two different routes: the middle Atlantic route via the Azores and Lisbon, terminating at Marseilles; and the northern route to Southampton, England with stopovers at New Brunswick, Newfoundland and Ireland. In the beginning Pan Am operated a weekly round trip to France and semi-weekly flights to England. By the end of July both routes were on a full one-a-week schedule and the demand for space was growing.

The B-314 set new standards for airborne luxury. Meals were served in a 14-seat dining room, with complete formal table settings. Every overseas passenger had a berth, and there was a private suite in the rear—the "bridal suite" someone called it. Passengers would find their shoes polished overnight, just as in a first class European hotel. Fare: $375 one way, $675 round trip.

But while people everywhere marveled at the size, range and comfort of the new Clippers flying the Atlantic, to the people at Pan Am they represented just one more stage in a never-ending process of development. Juan Trippe expressed this attitude in September, 1939, when he said: "These transoceanic Clippers are the 'giant' airplanes of today. But actually they are the last of the 'little' airplanes. There is a need for great ocean airliners two to three times the size of these Clippers . . ."

However, several years would pass before his vision would become a reality. World War II, which erupted in Europe just three months after the start of passenger service across the Atlantic, and would involve the United States two years later, halted the construction of new commercial aircraft.

When war broke out in Europe Pan Am, seeking to maintain complete neutrality in a tense situation, discontinued service to Southampton and Marseilles. Flights to Lisbon continued, however, and as the number of surface ships decreased Pan Am became an increasingly important line of communication between Europe and America. The State Department had urged an exodus of Americans from Europe, and a huge backlog of persons waiting for transportation developed; there were some 40,000 refugees in Portugal alone, and it seemed that all of them wanted to get on the Clipper to the United States. Mail loads also increased sharply, and to meet the demand Pan Am stepped up the frequency of its service. During 1940 Pan Am carried over 30 percent of all transatlantic mail.

At the same time, Pan Am was expanding its service in other parts of the world. In 1940 a route was opened to Auckland, New Zealand from San Francisco via Honolulu, Canton Island, and Noumea, and in 1941 Pan Am scheduled flights to Hong Kong and Singapore. That same year Pan Am inaugurated nonstop service between New York and Panama and increased frequency on many of its other Latin American routes. The South Atlantic was bridged with the start of regular flights between South America and Africa.

But the war in Europe and growing tensions between the United States and Japan overshadowed everything else, and Pan Am found itself getting more and more involved in special government projects. In mid-1940 Pan Am received a number of U.S. military contracts to construct or improve air bases in South America, the West Indies, along the Panama Canal and in Canada as part of a program to strengthen U.S. defenses.

Early in 1941 Pan Am, working in cooperation with the U.S. and British governments, was entrusted with the task of establishing an air transport service to Africa and across the continent to Egypt, and then operating a ferry service linked with that system to deliver military planes to the Middle East. Extending across almost 12,000 miles of ocean, jungle and desert, the route would normally have taken years to develop. Pan Am got it going in 60 days! So desperate was the need for the airports that some of them were in use before they were completed. In all, Pan Am built 14 bases in Africa, including runways, hangars, barracks and power stations, and brought in over 16,000 tons of equipment from the U.S. to outfit them.

Pan Am was in a unique position. On the eve of history's first global conflict, in a world that was depending more and more on the airplane, Pan Am alone had the equipment, the crews, and the experience to transport men and materials across oceans and continents literally to any place on the earth.

And it was about to demonstrate, over and over again, in countless ways, how vitally important an airline like Pan Am can be to a nation at war.

NEXT ISSUE

OF SPARKS JOURNAL will carry more of the "PAN AM" story. A review of the China Clipper from notes by Wilson T. Jarboe who was Society member No. 678-SOP. He became a Silent Key July 4 1978. Also some of Lindbergh's Pathfinder flights. Thanks to good members "Pete" Fernandez, Frank Schwella 1532-P, Ray Green (SK), Ralph Conly 2785V who will tell about the "Golden Age of Overseas Aviation in our next issue. We thank Pan-Am for pictures and other material furnished.

PAN AMERICAN WORLD AIRWAYS
PAA
The System of the Flying Clippers

Worked With Jarboe

Dear Bill:

Meant to mention that I worked with W. T. Jarboe for many years. First met him in Manila when he arrived on inaugural flight of the China Clipper and three of us (including me) from Globe Wireless, took Pilot Musick and Jarboe to dinner that night at Manila Hotel. In earlier dates, I had helped PAA Engineer Cushman install first Adcock antenna arrays for navigational use. In later years, then working for the early CAA, I was assigned by R.O. Donaldson to work with Pan-American Airways for flight radio operator training out of Dundalk, Maryland. Donaldson told me to report to PAA Communications Director and be darned if it didn't turn out to be Jarboe again. From 1939 through to 1947, worked at WSY in close association with Jarboe at LaGuardia. He was a great guy.

Since we've changed to publication of the Sparks Journal, I wonder if anyone there at headquarters happens to know where 'hardcover' or similar binders could be obtained. We've contacted a number of printing plants and stationery stores, but no help so far. Perhaps other members desire to preserve their copies, too, for posterity.

You are all busy people and I must not wander. Everyone on the staff of SOWP is doing a fine job. With deep appreciation and

73's

Lester E. Bachman 1219-P

PIONEERS . . . Wilson T. Jarboe, now Administrative Assistant-Communications, as he prepared, 25 years ago, for the first Pacific flight. Below, a few minutes later the China Clipper was en route, flying over the then-unfinished Golden Gate bridge.

Passengers deplaning at Lisbon. Flight from New York took 26 hours.

AIR AND SPACE BICENTENNIAL 1783 1983

- SHIPS OF THE AIR -

BOEING 314 [YANKEE CLIPPER] JUNE 17-19 1939 - NEW YORK TO SOUTHAMPTON VIA AZORES, LISBON & MARSEILLES

DESTINATION—EUROPE!

Commuters read about it on their way to work the morning of May 20, 1939. The lead paragraph of the story on page one of The New York Times was typical:

"Exactly twelve years after Colonel Charles Lindbergh began his historic New York to Paris hop in a single-engine monoplane, Pan American Airways' giant four-engine 41½-ton *Yankee Clipper* will take off from Port Washington, L.I., about one o'clock this afternoon on the first regularly scheduled airplane flight between this country and Europe."

The *Yankee Clipper*, destined to be the last of the big flying boats, had been built by Boeing. In 1936, just months after inaugurating its San Francisco to Manila service, Pan Am wrote Boeing asking them if they were up to the conception and construction of a long-range, four-engine marine aircraft that could profitably transport passengers and cargo across the Atlantic. They hesitated, then agreed to try. The result was the B-314, for its time an unusually spacious, powerful airplane. It was another instance of Pan Am serving as the catalyst—and the B-314, like almost all the other aircraft Pan Am helped develop, would win an honored place in aviation's record books.

(Continued on Page 39)

FLIGHT DECK OF BOEING B-314. PIX L/R: NAV. PILOT, CO-P, RADIO, ENGR.